# SCHEDULE E – TECHNICAL SPECIFICATIONS
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# SECTION X- TECHNICAL SPECIFICATIONS

This section contains the Standard Specifications and Revisions of Standard Specifications. Measurement and Payment for all bid items shall be in accordance with Section 9 - Measurement and Payment, and shall take precedence over the measurement and payment sections of the Standard Specifications or Revisions of Standard Specifications.

## 10.1 CDOT STANDARD SPECIFICATIONS

The following are the Standard Specifications which apply to this project. In the event there are conflicting Standard Specifications, the order of precedence will be based upon the order in which the Standard Specifications are listed. Section 9 - Measurement and Payment describes which specific Standard Specification sections apply to each bid item.

All Contractors are required to have on the job site and utilize the current updated copy of the Standard Specifications applicable to the work.

Any revisions to the Standard Specifications can be found in Subsection 10.2 of this document.

In order to avoid violating the Migratory Bird Treaty Act of 1918, if any trees or shrubs are to be removed or work on/under bridges is to be completed between April 1 and August 31, a survey must be completed for active nests. If an active nest(s) is found no work may be done within 50' of the nest(s) until the nest(s) becomes inactive. To avoid the survey requirement, it is recommended that all vegetation that needs to be removed, be removed after August 31 and before April 1. See Spec 240 for details.

The following sections of the "Colorado Department of Transportation Standard Specifications for Road and Bridge Construction", 2011, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to the bid items as specified in Section IX – Measurement and Payment.

Section 201 – Clearing and Grubbing
Section 202 – Removal of Structures and Obstructions
Section 203 – Excavation and Embankment
Section 206 – Excavation and Backfill for Structures
Section 207 - Topsoil
Section 208 – Erosion Control
Section 216 – Soil Retention Covering
Section 240 – Protection of Migratory Birds
Section 304 – Aggregate Base Course
Section 412 – Concrete Pavement
Section 503 – Drilled Caissons
Section 507 – Slope and Ditch Paving
Section 509 – Steel Structures
Section 512 – Bearing Device
Section 515 – Waterproofing Membrane
Section 518 – Waterstops and Expansion Joints
Section 601 – Structural Concrete
Section 602 – Reinforcing Steel
Section 603 – Culverts and Sewers
Section 604 – Manholes Inlets and Meter Valves

Section 606 – Guardrail
Section 607 – Fences
Section 614 – Traffic Control Devices
Section 620 – Field Facilities
Section 625 – Construction Surveying
Section 626 – Mobilization
Section 627 – Pavement Marking
Division 700 – Material Details

Contractors are required to have on the job site and utilize the current updated copies of the CDOT Standard Specifications for Road and Bridge Construction and Standard Plans - M&S Standards. Copies of both are available from CDOT.

## 10.2 CDOT PROJECT SPECIAL PROVISIONS

The definition of the Engineer in the Colorado Department of Transportation (CDOT) Standard Specifications is revised to mean the Engineer as defined in Section 100 of the City of Colorado Springs Engineering Division Standard Specifications.

References within the CDOT Standard Specifications that identify approval by CDOT are hereby revised to mean approval by the Engineer.

References within the CDOT Standard Specifications that identify requirements with CDOT Procedures are in effect to the extent the Engineer determines applicability to the City project.

References within the CDOT Standard Specifications that identify pre-approved products that are on the CDOT Approved Products List are recognized by the City as acceptable material for this City project.

The following Revisions supplement or modify the Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction. Measurement and Payment for all bid items shall be in accordance with Section IX - Measurement and Payment, and shall take precedence over the measurement and payment sections of the Standard Specifications and revisions thereof.

Revision of Section 107 – Dewatering
Revision of Section 107 – Transfer of Stormwater Permit to the Contractor
Revision of Section 203 – Imported Material For Embankment
Revision of Section 203,206,304 and 613 – Compaction
Revision of Section 206 – Imported Material for Structure Backfill
Revision of Section 206 – Structure Backfill (Flow-Fill)
Revision of Section 206 and 601 – Backfilling Structures That Support Lateral Earth Pressures
Revision of Section 208 – Erosion Control
Revision of Section 240 – Protection of Migratory Birds During Structure Work
Revision of Section 412 – Portland Cement Concrete Pavement Finishing
Revision of Section 412, 601 and 711 – Liquid Membrane-Forming Compounds for Curing Concrete
Revision of Section 503 – Drilled Caissons
Revision of Section 518 – Waterstops and Expansion Joints
Revision of Section 518 – Bridge Expansion Device
Revision of Section 601 – Structural Concrete
Revision of Section 601 – Concrete Batching
Revision of Section 601 – Concrete Finishing
Revision of Section 601 – Concrete Form and Falsework Removal
Revision of Section 601 – Concrete Slump Acceptance
Revision of Section 601 – Underwater Concreting
Revision of Section 601 – Concrete Formliners Type 1
Revision of Section 601 – Cut Stone Veneer
Revision of Section 601 – QC Testing Requirements for Structural Concrete
Revision of Section 601 and 708 – Structural Concrete Stain
Revision of Section 602 – Reinforcing Steel
Revision of Section 606 – Bridge Rail
Revision of Section 607 – Fence (Plastic)

Revision of Section 610 – Landscape Rock
Revision of Section 618 – Prestressed Concrete
Revision of Section 620 – Field Office
Revision of Section 625 – Construction Surveying
Revision of Section 626 – Mobilization
Revision of Section 703 – Aggregate for Bases
Revision of Section 703 – Concrete Aggregates
Revision of Section 712 - Geotextiles
Revision of Section 712 – Water For Mixing or Curing Concrete
Revision of Section 713 – Epoxy Pavement Marking

## REVISION OF CDOT SECTION 107
## DEWATERING

Section 107 of the Standard Specifications is hereby revised for this project as follows:

Sections 107.1 through 107.24 shall be deleted in their entirety.

**REVISION OF CDOT SECTION 208**
**EROSION CONTROL**

Section 208 of the Standard Specifications is hereby revised for this project to include the following:

All References to *CDOT Erosion Control and Stormwater Quality Guide* shall be directed to the *City of Colorado Springs Drainage Criteria Manual, Volume 2 (DCM)*.

Contractor's price bid for erosion control measures shall be paid for the measured quantity of each item installed and accepted by the Engineer. This includes all material, labor, equipment, excavation, backfill, and maintenance of erosion control measure and disposal of erosion control measures. Erosion control measures shall include all materials listed in CDOT Section 208 and the *City of Colorado Springs Drainage Criteria Manual, Volume 2* as it relates to the respective erosion control measure as noted in the Measurement and Payment Section.

Contractor shall coordinate with Engineer to determine when erosion control measures require replacement.

In addition to Section 208:

Temporary Stream Crossing generally falls into the following categories:

1. Normal low flows along the channel

2. Storm/flood flows along the channel

3. Flows from existing storm drain pipelines; and

4. Local surface inflows not conveyed by pipelines

Contractor shall coordinate, evaluate, design, construct, and maintain temporary water conveyance systems. These systems shall not worsen flooding, alter major flow paths, or worsen flow characteristics during construction. Contractor is responsible to ensure that any such worsening of flooding does not occur. Contractor is solely responsible for determining the methods and adequacy of water control measures.

At a minimum, Contractor shall be responsible for diverting the quantity of surface flow around the construction area so that the excavations will remain free of surface water for the time it takes to install these materials, and the time required for curing of any concrete or grout. Contractor is cautioned that the minimum quantity of water to be diverted is for erosion control and construction purposes and not for general protection of the construction-site. It shall be Contractor's responsibility to determine the quantity of water which shall be diverted to protect the work from damage caused by stormwater.

Contractor shall, at all times, maintain a flow path for all channels. Temporary structures such as berms, sandbags, pipeline diversions, etc., may be permitted for the control of channel flow, as long as such measures are not a major obstruction to flood flows, do not worsen flooding, or alter historic flow routes.

The first paragraph of Subsection 208.02(l) shall be deleted and replaced with the following:

> *Gravel Bag*. Gravel Bags, <u>also called curb socks or rock socks</u>, shall consist of aggregate-filled fabric with the following dimensions:

The last paragraph of Subsection 208.02(l) shall be deleted and replaced with the following:

Aggregate contained in the gravel bags, also called curb socks or rock socks, shall consist of gravel or crushed stone conforming to Table 703-7 for Class C.

## REVISION OF CDOT SECTION 240
## PROTECTION OF MIGRATORY BIRDS DURING STRUCTURE WORK

Section 240 is hereby added to the Standard Specifications for this project as follows:

### DESCRIPTION

240.01 This work consists of protecting migratory birds during construction work on structures.

### MATERIALS AND CONSTRUCTION REQUIREMENTS

240.02 Work On Structures. The Contractor shall prosecute work on structures in a manner that does not result in a taking (pursue, hunt, take, capture or kill; attempt to take, capture, kill or possess) of migratory birds protected by the Migratory Bird Treaty Act (MBTA).

The Contractor shall not prosecute the work on structures during the primary breeding season, April 1 through August 31, unless he takes the following actions:

(1) The Contractor shall remove existing nests prior to April 1. If the Contract is not awarded prior to April 1 and CDOT has removed existing nests, then the monitoring of nest building shall become the Contractor's responsibility upon Notice to Proceed.
(2) During the time that the birds are trying to build or occupy their nests, between April 1 and August 31, the Contractor shall monitor the structures at least once every three days for any nesting activity.
(3) If the birds have started to build any nests, the nests shall be removed before they are completed. Water shall not be used to remove the nests if nests are located within 50 feet of any surface waters.
(4) Installation of netting may be used to prevent nest building. The netting shall be monitored and repaired or replaced as needed. Netting shall consist of a mesh with openings that are ¾ inch by ¾ inch or less.

If an active nest becomes established, i.e., there are eggs or young in the nest, all work that could result in abandonment or destruction of the nest shall be avoided until the young have fledged or the nest is unoccupied as determined by the CDOT biologist and approved by the Engineer. The Contractor shall prevent construction activity from displacing birds after they have laid their eggs and before the young have fledged.

If the project continues into the following spring, this cycle shall be repeated. When work on the structure is complete, the Contractor shall remove and properly dispose of netting used on the structure.

The taking of a migratory bird shall be reported to the Engineer. The Contractor shall be responsible for all penalties levied by the U. S. Fish and Wildlife Service (USFWS) for the taking of a migratory bird.

## METHOD OF MEASUREMENT

240.03 Removal of nests will be measured by the actual number of man-hours spent removing inactive nests just prior to and during the breeding season, April 1 through August 31. During this period, the Contractor shall submit to the Engineer each week for approval a list of the workers who removed nests and the number of hours each one spent removing nests

Netting will be measured by the square yard of material placed to keep birds from nesting on the structure. Square yards will be calculated using the length of netting measured where it is attached to the ground and the average height of the netting where it is attached to the structure.

## BASIS OF PAYMENT

240.04 The accepted quantities measured as provided above will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule.

| Pay Item | Pay Unit |
|---|---|
| Removal of Nests | Hour |
| Netting | Square Yard |

Payment for Removal of Nests will be full compensation for all work and material required to complete the work.

Payment for netting will be full compensation for all work and material required to complete the item. Overlaps of netting will not be measured and paid for separately, but shall be included in the work. Maintenance and replacement, removal, and disposal of netting will not be measured and paid for separately, but shall be included in the work.

**REVISION OF CDOT SECTION 503**
**DRILLED CAISSONS**

Section 503 of the Standard Specification is hereby revised:

Section 503.01 shall include the following:

The Geotechnical Engineering Report for this project written by Geocal, dated July 2014, shall be considered part of this specification.

Section 503.03 paragraph 5 shall include the following:

The drilling operations may encounter ground water. Caving conditions are expected and the contractor shall provide casings as described in section 503.06.

Section 503.04 shall include the following:

The contractor shall engage the services of a qualified geotechnical engineer to determine the elevation of caisson tip during the drilling operation for the bridge and the retaining wall and complete a report for each caisson as described below. Contractor shall drill caissons to the specified embedment length as shown on the foundation drawings. Services of the geotechnical engineer shall be included in the cost of the drilled caisson.

The extent of Undocumented Fill material shall be determined by the geotechnical engineer during the drilling operations of the drilled caissons for the retaining wall RW-109-RT. The tip elevation of the drilled caissons maybe adjusted as directed by the geotechnical engineer to maintain the minimum embedment requirements of the drilled caissons as stated in the plans.

Section 503.07 paragraph 3 shall be replaced with the following:

Submit a signed statement after the award of the contract affirming that the contractor (or that Subcontractor if applicable) has inspected the project site and the available subsurface information.

The Contractor shall submit a Drilled Caisson Installation Plan no later than 30 days after the Notice of Award. Submit a separate Drilled Caisson Installation Plan for the Bridge Caissons and the Retaining Wall Caissons for review by the Engineer with the following information:

List of all proposed equipment to be used on the project, including, cranes, templates, drill rigs, drills, augers, concrete and rock socket core barrels/downhole hammers, bailing buckets, final cleaning equipment (including airlift/suction equipment), core sampling equipment, welding equipment, tremie, concrete pumps, casing, lifting ring, and cradle, etc.

Details of the overall construction operation sequence, and the sequence of drilled caisson construction, including a specific planned schedule for caisson installation.

Details and methods for locating and maintaining drilled caisson and casing position and alignment during excavation, inspection, and concreting operations, including curing and the use of temporary tool casing. All templates must be fixed to the ground and stable.

Details and methods for caisson excavation.

Details and procedures for the installation and removal of temporary casing.

Details and procedures to prevent caving of exiting backfill material into caisson excavations due to unknown existing footing boundaries.

Details of methods to mechanically clean the drilled caisson excavation.

Details, methods, equipment for bottom inspections.

Details of methods for concrete mixing, transport, and placement.

Mix designs for concrete.

Quality Controls for Slurry

The Engineer will evaluate the Drilled Caisson Installation Plan for the bridge and the retaining wall for conformance with the Plans, Specifications, and this Section. Within 20 days after receipt of each plan, the Engineer will notify the contractor in writing of any additional information required and/or changes necessary to meet the contract requirements. Submit proposed changes within 7 days of receiving comments. The Engineer will notify the contractor within 7 days of receipt of the proposed changes to the plan of their acceptance or rejection. The Contractor cannot start construction on any items affected by the Drilled Caisson Installation Plan until approved by the Engineer. After approval of the installation plan, make no changes to the procedures without review and acceptance by the Engineer.

All procedural approvals given by the Engineer are subject to trial in the field. The review and acceptance of the procedure by the Engineer is to ensure that the method is a reasonable approach for constructing the drilled caisson in accordance with the plans and specifications and does not relieve the contractor of the responsibility for the Drilled Caisson Installation Plan.

If the procedures fail to perform to the satisfaction of the City, the contractor shall propose and submit an alternate method for constructing the drilled caissons and allow 7 days for review by the Engineer. This failure shall not result in any additional cost to the City or relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the Plans and Specifications. Delays due to a procedural failure or resubmission of the Drilled Caisson Installation Plan will be at no additional cost to the City and with no extension of contract time.

The contractor shall hold a Drilled Caisson Pre-Construction Meeting to discuss drilled caisson construction. This meeting will be held after all drilled caisson submittals have been received and reviewed by the Engineer and at least 7 days prior to the beginning of drilled caisson construction. The purpose of the meeting is to discuss construction procedures, personnel, and equipment to be used. The following are required to attend:

Project Superintendent, Drilled Caisson Superintendent, Contractor’s Geotechnical Engineer, and other individuals designated by the City. If the Contractor's key personnel change or, if the Contractor proposes a significant revision to Drilled Caisson Installation Plan, then an additional drilled caisson preconstruction meeting may be required at the discretion of the City.

Within 24 hours of the completed construction of each drilled caisson, submit a report on the actual location, alignment, elevation, and dimensions of the drilled caisson and a completed drilled caisson log of materials encountered as specified herein.

Location and dimensions of the excavation.

Top and bottom elevations.

Measurement data for plumbness.

Methods of excavation used.

Description of materials encountered during excavation.

Description of groundwater conditions encountered.

Description of obstructions encountered and whether obstruction removal was achieved.

Description of temporary casing placed including purpose, length, and wall thickness and anchorage or sealing methods used if any.

Elevation at which the top of rock was encountered and description of rock.

Shaft section and rock socket measurements.

Description of cleanout methods and adequacy of initial cleanout and final cleanout just prior to concrete placement.

Record of depth of water in excavation and rate of water infiltration prior to concrete placement.

Record of reinforcing steel inspection for position and adequacy.

Method of concrete placement and casing removal. Record of concrete head and elevation during removal of casing. Record of concrete elevation when vibration started.

Difficulties encountered including soil inclusion, voids, caisson squeeze-in, and casing collapse.

Concreting curves showing actual versus theoretical volume of concrete required to fill caisson excavation.

Condition of concrete delivered to site including record of slump, density, air content, and other tests. Record of cylinders made for compression testing. Concrete curing details.

Any deviations from the caisson installation plan.

## REVISION TO CDOT SECTION 518
## WATERSTOPS AND EXPANSION JOINTS

Section 518 of the Standard Specifications is hereby revised to include the following:

Subsection 518.08, first paragraph, first sentence, is deleted and replaced with the following:

The Contractor shall submit working drawings as specified in subsection 108.19 of the revised *City of Colorado Springs Engineering Division Standard Specifications*.

Subsection 518.09, eleventh paragraph, last sentence, is deleted and replaced with the following:
The watertight integrity test is not required for joints at the roadway end of approach slabs. The watertight integrity test is required for joints at the bridge end of approach slabs.

Subsection 518.10(a), first paragraph, first sentence, is deleted and replaced with the following:
The Contractor shall submit shop drawings as specified in subsection 108.19 of the revised *City of Colorado Springs Engineering Division Standard Specifications*.

Subsection 518.10(c), third paragraph, is deleted and replaced with the following:
In order to perform the work of installing the expansion joint device in a proper manner, some portions of the curb and bridge deck cannot be constructed until after the expansion device is installed. After the modular expansion joint device has been set to its final line and grade, recess openings in the deck and curb shall be filled with concrete Class D or H. Prior to concrete placement, all existing concrete surfaces shall be primed with a CDOT approved epoxy polysulfide grout. The grout shall be placed according to the manufacturer's instructions. The uppermost surface of the concrete placement shall have a broom finish. The cost of this work including grout placement shall be included in the unit price bid for concrete Class D or H.

**REVISION OF CDOT SECTION 518**
**BRIDGE EXPANSION DEVICE**

Section 518 of the Standard Specifications is hereby revised for this project as follows:

In subsection 518.04, delete the fifth paragraph and replace with the following:

All structural steel elements of the bridge expansion device, including cover plates, shall be galvanized after fabrication in accordance with Section 509, whether or not they are in contact with the elastomeric seals.

In subsection 518.05 (b), delete the third paragraph and replace with the following:

All structural steel elements of the bridge expansion device, including cover plates, shall be galvanized after fabrication in accordance with Section 509, whether or not they are in contact with the elastomeric seals.

## REVISION TO CDOT SECTION 601
## STRUCTURAL CONCRETE

**Sections 601 of the Standard Specifications are hereby revised for this project as follows:**

Delete subsection 601.02 and replace with the following:

**601.02 Classification.** The classes of concrete shown in Table 601-1 shall be used when specified in the Contract.

**Table 601-1**
**CONCRETE TABLE**

| Concrete Class | Required Field Compressive Strength (psi) | Cementitious Content: Minimum or Range (lbs/yd$^3$) | Air Content: % Range (Total) | Water Cementitious Ratio: Maximum or Range |
|---|---|---|---|---|
| **B** | 4500 at 28 days | N/A | 5 - 8 | 0.45 |
| **BZ** | 4000 at 28 days | 610 | N/A | 0.45 |
| **D** | 4500 at 28 days | 615 to 660 | 5 – 8 | 0.44 |
| **DT** | 4500 at 28 days | 700 | 5 – 8 | 0.44 |
| **E** | 4200 at 28 days | 660 | 4 – 8 | 0.44 |
| **H** | 4500 at 56 days | 580 to 640 | 5 – 8 | 0.38 - 0.42 |
| **HT** | 4500 at 56 days | 580 to 640 | 5 – 8 | 0.38 - 0.42 |
| **P** | 4200 at 28 days | 660 | 4 – 8 | 0.44 |
| **S35** | 5000 at 28 days | 615 to 720 | 5 – 8 | 0.42 |
| **S40** | 5800 at 28 days | 615 to 760 | 5 – 8 | 0.40 |
| **S50** | 7250 at 28 days | 615 to 800 | 5 – 8 | 0.38 |

**Class B** concrete is an air entrained concrete for general use. Class D, H or P concrete may be substituted for Class B concrete. Additional requirements are: The coarse aggregate shall have a nominal maximum size of 1½ inches or smaller. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class BZ** concrete is concrete for drilled piers. Additional requirements are: Entrained air is not required unless specified in the Contract. High range water reducers may be added to obtain desired slump and retardation. Slump shall be a minimum of 5 inches and a maximum of 8 inches. The concrete mix shall be made with AASHTO M 43 size No. 67, No. 7 or No. 8 coarse aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class D** concrete is a dense medium strength structural concrete. Class H may be substituted for Class D concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6 or No. 67 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class DT** concrete may be used for deck resurfacing and repairs. Class HT may be substituted for Class DT concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall consist of a minimum 50 percent AASHTO M 43 size No. 7 or No. 8 coarse aggregate by weight of total aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class E** concrete may be used for fast track pavements needing early strength in order to open a pavement to service soon after placement. Additional requirements are: Type III cement may be used The concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 357 or No. 467 coarse aggregate by weight of total aggregate. If all transverse joints are doweled, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 357, or No. 467 coarse aggregate by weight of total aggregate. The laboratory trial mix must produce an average 28 day flexural strength of a minimum 650 psi. Class E concrete shall contain a minimum 10 percent to a maximum of 20 percent Class C, or a minimum 10 percent to a maximum 30 percent Class F fly ash by weight of total cementitious.

**Class H** concrete is used for bare concrete bridge decks that will not receive a waterproofing membrane. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall consist of a minimum of 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Class H concrete shall contain cementitious materials in the following ranges: 450 to 500 pounds per cubic yard Type II portland cement, 90 to 125 pounds per cubic yard fly ash and 20 to 30 pounds per cubic yard silica fume. The total content of Type II portland cement, fly ash and silica fume shall be 580 to 640 pounds per cubic yard. The laboratory trial mix must not exceed permeability of 2000 coulombs at 56 days (ASTM C 1202) and must not exhibit a crack at or before 14 days in the cracking tendency test (AASHTO PP 34).

**Class HT** concrete is used as the top layer for bare concrete bridge decks that will not receive a waterproofing membrane. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall consist of a minimum of 50 percent AASHTO M 43 size No. 7 or No. 8 coarse aggregate by weight of total aggregate. Class HT concrete shall contain cementitious materials in the following ranges: 450 to 500 pounds per cubic yard Type II portland cement, 90 to 125 pounds per cubic yard fly ash and 20 to 30 pounds per cubic yard silica fume. The total content of Type II portland cement, fly ash and silica fume shall be 580 to 640 pounds per cubic yard. The laboratory trial mix must not exceed permeability of 2000 coulombs at 56 days (ASTM C 1202) and must not exhibit a crack at or before 14 days in the cracking tendency test (AASHTO PP 34).

**Class P** concrete is used in pavements. Additional requirements are: The concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 357 or No. 467 coarse aggregate by weight of total aggregate. If all transverse joints are doweled, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 357, or No. 467 coarse aggregate by weight of total aggregate. The laboratory trial mix must produce an average 28 day flexural strength of a minimum 650 psi. Class P concrete shall contain a minimum 10 percent to a maximum of 20 percent Class C, or a minimum 10 percent to a maximum 30 percent Class F fly ash by weight of total cementitious. Unless acceptance is based on flexural strength, the total weight of cementitious shall not be less than 660 pounds per cubic yard. If acceptance is based on flexural strength, the total weight of cementitious shall not be less than 520 pounds per cubic yard.

**Class S35** concrete is a dense high strength structural concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 7 or No. 8 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class S40** concrete is a dense high strength structural concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 7 or No. 8 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67

coarse aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class S50** concrete is a dense high strength structural concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 7 or No. 8 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious. The laboratory trial mix must not exhibit a crack at or before 14 days in the cracking tendency test (AASHTO PP 34).

Subsection 601.03 shall include the following:

Where blended hydraulic cement is used the substitution of fly ash for the blended hydraulic cement is not allowed.

Subsection 601.04 shall include the following:

**601.04 Sulfate Resistance.** The Contractor shall provide protection against sulfate attack on concrete structures by providing concrete structures manufactured with requirements according to Table 601-4. The exposure Class will be stated on the plans. A higher level of requirements may be used for a lower level of exposure.

If the Contractor can provide a test report that shows another class of exposure exists at a structure location, then the Engineer may accept a concrete mix for that location that meets the corresponding sulfate protection requirements in addition to other requirements shown in this section.

**Table 601-4**
**REQUIREMENTS TO PROTECT AGAINST DAMAGE TO CONCRETE BY SULFATE ATTACK FROM EXTERNAL SOURCES OF SULFATE**

| Severity of potential exposure | Water-soluble sulfate ($SO_4$), percent, dry soil | Sulfate ($SO_4$) in water, ppm | Water cementitious ratio, maximum | Cementitious material requirements |
|---|---|---|---|---|
| Class 0 | 0.00 to 0.10 | 0 to 150 | 0.45 | Class 0 |
| Class 1 | 0.11 to 0.20 | 151 to 1500 | 0.45 | Class 1 |
| Class 2 | 0.21 to 2.00 | 1501 to 10,000 | 0.45 | Class 2 |
| Class 3 | 2.01 or greater | 10,001 or greater | 0.40 | Class 3 |

Cementitious material requirements are as follows:

Class 0 requirements shall be one of the following:

(1) ASTM C 150 Type I, II or V
(2) ASTM C 595 Type IP
(3) ASTM C 1157 Type GU
(4) ASTM C 150 Type III cement if it is allowed, as in Class E concrete

Class 1 requirements for sulfate resistance shall be one of the following:
PART 1 - ASTM C 150 Type II or V; Class C fly ash shall not be allowed in the concrete mix
PART 2 - ASTM C 595 Type IP(MS)
PART 3 - ASTM C 1157 Type MS
PART 4 - When ASTM C 150 Type III cement is allowed, as in Class E concrete, it shall have no more than 8 percent $C_3A$. Class C fly ash shall not be allowed in the concrete mix

Class 2 requirements for sulfate resistance shall be one of the following:
(1) ASTM C 150 Type V with a minimum of a 20 percent substitution of Class F fly ash by weight

(2) ASTM C 150 Type II or III with no more than 0.040 percent expansion at 14 days when tested in accordance with ASTM C 452 with a minimum of a 20 percent substitution of Class F fly ash by weight
(3) ASTM C 1157 Type HS
(4) A blend of portland cement meeting ASTM C 150 Type II or III with a minimum of 20 percent Class F fly ash by weight, where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C 1012.

Class 3 requirements for sulfate resistance shall be one of the following:

(1) A blend of portland cement meeting ASTM C 150 Type II, III, or V with a minimum of a 20 percent substitution of Class F fly ash by weight , where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.
(2) ASTM C 1157 Type HS having less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

When fly ash is used to enhance sulfate resistance, it shall be used in a proportion greater than or equal to the proportion tested in accordance to ASTM C1012 and it shall have a calcium oxide content no more than 2.0 percent greater than the fly ash tested according to ASTM 1012.

Delete subsection 601.05 and replace with the following:

**601.05 Proportioning.** The Contractor shall submit a Concrete Mix Design for each class of concrete being placed on the project. Concrete shall not be placed on the project before the Concrete Mix Design Report has been reviewed and approved by the Engineer. The Concrete Mix Design will be reviewed and approved following the procedures of CP 62. The Concrete Mix Design will not be approved when the laboratory trial mix data are the results from tests performed more than two years in the past or aggregate data are the results from tests performed more than two years in the past. The concrete mix design shall show the weights and sources of all ingredients including cement, pozzolan, aggregates, water, additives and the water cementitious ratio (w/c). When determining the w/c, cementitous (c) shall be the sum of the weight of the cement, the weight of the fly ash and the weight of silica fume.

The laboratory trial mix data shall include results of the following:

(1) AASHTO T 119 (ASTM C 143) Slump of Hydraulic Cement Concrete.
(2) AASHTO T 121 (ASTM C 138) Weight per Cubic Foot, Yield, and Air Content (Gravimetric) of Concrete.
(3) AASHTO T 152 (ASTM C 231) Air Content of Freshly Mixed Concrete by the Pressure Method
(4) ASTM C 39 Compressive Strength of Cylindrical Concrete Specimens shall be performed with at least two specimens at 7 days and three specimens at 28 days. Three additional specimens tested at 56 days shall be required for Class H and HT concrete.
(5) Class H and HT concrete shall include a measurement of permeability by ASTM C 1202 Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration. The concrete test specimens shall be two 2 inch thick disks sawed from the centers of two molded 4 inch diameter cylinders cured 56 days in accordance with ASTM C 192 Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
(6) Class H, HT and S50 concrete shall include a measurement of cracking by AASHTO PP 34 Standard Practice for Estimating the Cracking Tendency of Concrete. The ring shall be cured in an indoor room with the temperature maintained 65 to 75 □F and relative humidity not exceeding 40 percent.
(7) Class E and P concrete shall include AASHTO T 97 (ASTM C 78) Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading) performed with at least two specimens at seven days and four specimens at 28 days.

Prior to placement of Class E concrete, the Contractor shall provide the Engineer a report of maturity relationships in accordance with CP 69. The Contractor shall provide maturity meter and all necessary wire and connectors. The Contractor shall be responsible for the placement and maintenance of the maturity meter and wire. Placement shall be as directed by the Engineer.

Except for class BZ concrete, the maximum slump of the delivered concrete shall be the slump of the approved concrete mix design plus 1½ inch. Except for class H and HT concrete, the laboratory trial mix must produce an average 28 day compressive strength at least 115 percent of the required 28 day field compressive strength. The laboratory trial mix for Class H or HT concrete must produce an average 56 day compressive strength at least 115 percent of the required 56 day field compressive strength.
The laboratory trial mix shall have a relative yield of 0.99 to 1.02. When Portland Cement Concrete Pavement is paid with a volumetric pay quantity, the relative yield of the concrete produced on the project shall be 0.99 to 1.02.

If the relative yield of the produced concrete does not conform to this range for two consecutive yield determinations, concrete production shall cease and the Contractor shall present a plan to correct the relative yield to the Engineer.

Aggregate data shall include the results of the following:

(1) AASHTO T 11 (ASTM C 117) Materials Finer Than 75 um (No. 200) Sieve in Mineral Aggregates by Washing.
(2) AASHTO T 19 (ASTM C 29) Unit Weight and Voids in Aggregate.
(3) AASHTO T 21 (ASTM C 40) Organic Impurities in Fine Aggregate for Concrete.
(4) AASHTO T 27 (ASTM C 136) Sieve Analysis of Fine and Coarse Aggregates.
(5) AASHTO T 84 (ASTM C 128) Specific Gravity and Absorption of Fine Aggregate.
(6) AASHTO T 85 (ASTM C 127) Specific Gravity and Absorption of Coarse Aggregate.
(7) AASHTO T 96 (ASTM C 131) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
(8) AASHTO T 104 (ASTM C 88) Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
(9) AASHTO T 176 (ASTM D 2419) Plastic Fines in Graded Aggregates and Soils by use of the Sand Equivalent Test
(10) ASTM C 535 Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
(11) CP-L 4201 Determining the Potential Alkali Reactivity of Aggregates (Accelerated Mortar-Bar Method). When an aggregate source is known to be reactive, CP-L 4202 results may be submitted in lieu of CP-L 4201 results.

Any aggregate tested by CP-L 4201 with an expansion of 0.10 percent or more, or that is known to be reactive, shall not be used unless mitigative measures are included in the mix design. Mitigative measures shall be tested using CP-L 4202 and exhibit an expansion less than 0.10 percent by one of the following methods:

(1) Combined Aggregates. The mix design sources of aggregates, cement and mitigative measures shall be tested. The proportions of aggregates and mitigative measures shall be those used in the mix design.
(2) Individual Aggregates. Each source and size of individual aggregates shall be tested. The source of cement and mitigative measures shall be those used in the mix design. The highest level of mitigative measures for any individual aggregate shall be the minimum used in the mix design.

The Concrete Mix Design Report shall include Certified Test Reports showing that the cement, fly ash and silica fume admixture meet the specification requirements and supporting this statement with

actual test results. The certification for silica fume shall state the solids content if the silica fume admixture is furnished as slurry.

Where the Contractor's use of fly ash results in any delay, necessary changes in admixture quantities or source, or unsatisfactory work, the cost of such delays, changes or corrective actions shall be borne by the Contractor.

The Contractor shall submit a new Concrete Mix Design Report meeting the above requirements when a change occurs in the source, type, or proportions of cement, fly ash, silica fume or aggregate. When a change occurs in the source of approved admixtures, the Contractor shall submit a letter stamped by the Concrete Mix Design Engineer approving the changes to the existing mix design. The change will be approved by the Engineer prior to use.

The use of approved accelerating, retarding or hydration stabilizing admixtures to existing mix designs will be permitted at the discretion of the Engineer when documentation includes the following:

(1) Manufacturers recommended dosage of the admixture

(2) A letter stamped by the Concrete Mix Design Engineer approving the changes to the existing mix design.

Unless otherwise permitted by the Engineer, the product of only one type of portland cement from one source of any one brand shall be used in a concrete mix design.
Review and approval of the Concrete Mix Design by the Engineer does not constitute acceptance of the concrete. Acceptance will be based solely on the test results of concrete placed on the project.

Delete subsection 601.08 and replace with the following:

**601.08 Air Content Adjustment.** When a batch of concrete delivered to the project does not conform to the minimum specified air content, an air entraining admixture conforming to subsection 711.02 may be added in accordance with subsection 601.17. After the admixture is added, the concrete shall be re-mixed for a minimum of 20 revolutions of the mixer drum at mixing speed. The concrete will then be re-tested by QC.

In subsection 601.11 (a), delete the first three paragraphs and replace with the following:

(a) *General.* The Contractor shall be responsible for designing and constructing falsework.

The Contractor's Engineer shall determine whether falsework is necessary. When the Contractor's Engineer determines falsework is unnecessary, the Contractor shall submit a written statement signed by the Contractor's Engineer so stating. All falsework drawings, including revisions, shall be prepared by the Contractor's Engineer, shall meet the requirements of subsection 601.11, and shall be provided by the Contractor to the Engineer for record purposes only. The drawings shall be signed and sealed by the Contractor's Engineer. These drawings shall be stamped "Approved for Construction" and signed by the Contractor prior to providing them to the Engineer. The drawings will not be approved by the Engineer.

Subsection 601.12 (a) shall include the following:

Unless otherwise specified, hand finishing methods will be permitted only when performed under the direct supervision of a Craftsman holding the following certificate: ACI Concrete Flatwork Finisher and Technician (ACICFFT) or other Flatwork Finisher certification program approved by the Department. A minimum of one certified Craftsman is required at each finishing operation. A minimum of one certified Craftsman is required for each three or fewer finishers (non-certified ACICFFTs) at each operation.

Subsection 601.12(d) shall include the following:

The Contractor shall not use pipes, chutes, troughs, spouts, or tremies that are fabricated of aluminum materials for pumping, conveying, or placing concrete.

Subsection 601.12(g) shall include the following:

When concrete is placed by pumping, the pumping equipment shall be thoroughly cleaned prior to concrete placement. Excess form release agent shall be removed from the hopper. The pump shall be primed at the Contractor's expense by pumping and discarding enough concrete to produce a uniform mix exiting the pump. At least 0.25 cubic yard of concrete shall be pumped and discarded to prime the pump. Water shall not be added directly into the concrete pump hopper after placement has commenced. If water is added to the concrete pump hopper, all concrete in the concrete pump hopper and the line shall be discarded and the pump re-primed at the Contractor's expense.

The pump operator shall have a valid operator's certification from the American Concrete Pumping Association. Boom pumps shall have a current Concrete Pump Manufacturers Association's CPMA27-2000 certification. Equipment added to the pump shall meet the pump manufacturer's specifications. The Contractor shall submit the specifications of the pumping equipment and the qualifications of the operator to the Engineer for review at least two weeks prior to pumping concrete. Equipment and operators rejected by the Engineer shall be replaced at the Contractor's expense.

The pump shall be operated so that a continuous stream of concrete is produced. The pump equipment shall use a minimum of one of the following to maintain concrete uniformity:

(1) A 360 degree loop immediately prior to the delivery end of the pump line.
(2) A minimum one inch reducer installed at the entry to the delivery hose.
(3) A minimum one inch reducing delivery hose.
(4) A cable attached to the pump boom creating a minimum 90 degree bend in the steel braded flexible hose. The point of discharge from the flexible hose at the end of the boom shall be at or above the lowest point of the bend.
(5) On horizontal pours a 10-foot minimum horizontal delivery system placed on the deck.
(6) Other approved methods.

Metal pump lines or couplings shall not rest directly on epoxy coated reinforcing steel.

The point of discharge of the pump shall be as close to the bridge deck elevation as possible.

Subsection 601.12 (j), third paragraph, shall include the following:

When concrete is to be placed on or adjacent to hardened concrete surfaces, the surface shall be saturated surface dry. Saturated surface dry concrete has no water on its surface. The pores of the concrete beneath the surface are moist.

Subsection 601.14(a) shall include the following:

The finishing of hardened concrete surfaces shall not require a certified Concrete Flatwork Finisher as described in subsection 601.12(a).

Delete subsection 601.17(a) and replace with the following:

*(a) Air Content*. The first three batches at the beginning of production shall be tested by QC and QA for air content. When air content is below the specified limit, it may be adjusted in accordance with subsection 601.08. Successive batches shall be tested by QC and witnessed by the Engineer until three consecutive batches are within specified limits. After the first three batches, CDOT will follow the random minimum testing schedule. Air content shall not be adjusted after a QA test.

At any time during the placement of the concrete, when a QA test on a batch deviates from the minimum or maximum percent of total air content specified, the following procedure will be used to analyze the acceptability of the concrete.

1. A batch that deviates from the specified air content by more than 1 percent and all Class D, DT, HT and H concrete placed in bridge decks with air content exceeding 8 percent will be rejected. Portions of loads incorporated into structures prior to determining test results which indicate rejection as the correct course of action shall be subject to acceptance at reduced price, no payment, or removal as determined by the Engineer.

2. A batch that deviates from the specified air content by 1 percent or less may be accepted at a reduced price using Table 601-3.

**REVISION OF CDOT SECTION 601**
**UNDERWATER CONCRETING**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

In subsection 601.12, delete (f) and replace with the following:

(f) *Depositing Concrete Under Water*. Concrete, except for cofferdam seals, shall not be deposited under water, unless approved by the Engineer. If approved, care shall be exercised to prevent the formation of laitance. Concrete shall not be deposited until all laitance, which may have formed on concrete previously placed, has been removed. Pumping shall be discontinued while depositing foundation concrete if it results in a flow of water inside the forms. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a concrete pump and tremie. The discharge or bottom end of the tremie shall be lowered to contact the foundation at the start of the concrete placement and shall be raised during the placement at a rate which will insure that the bottom or discharge end of the tremie is continuously embedded or buried in fresh concrete a minimum of 12 inches. Air and water shall be excluded from the tremie pipe by keeping the pipe continuously filled. The continuity of the placement operation shall be maintained without breaking the seal between the concrete mass and the discharge end of the tremie until the lift is completed. The concrete placement shall not be disturbed after it has been deposited.

**REVISION OF CDOT SECTION 601**
**CONCRETE FORMLINER TYPE 1**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

Subsection 601.09 (a) shall include the following:

The Form Liner used on this project shall be all of the following arranged as shown on the Bridge Plans:

Formliner Type 1 – "Extra Rough Saw", Pattern #104

By Scott Systems
10777 E. 45th Ave
Denver, CO 80239
303 373 2500

Other manufacturer's products will be accepted provided sufficient information is submitted to allow the Engineer to determine that products proposed are equivalent to those named.

Design and patterns of the concrete surface shall follow those shown in the plans. See Revision of CDOT Section 601 – Structural Concrete Staining for examples of limits of formliners.

Where two or more molds come together, the formliner sections shall be placed so that seam lines or match lines shall not be apparent when viewing the final structure. Where wall panels join along the wall or at a corner, the formliner pattern shall not deviate across the joint.

The form release agent shall be compatible with the molds and with the color coating system to be applied to the final surface.

The molds shall be removable without causing damage to the surface or underlying concrete.

Formlined surfaces shall receive a Class 1 Finish.

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PCN 16986 November 18th, 2015

**REVISION OF CDOT SECTION 601**
**CUT STONE VENEER**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

Subsection 601.09 shall include the following:

Cut Stone Veneer shall conform to all work and specifications described in the following revisions to the City of Colorado Springs Standard Specifications:

Addition of Section 620 Stone Masonry
Addition of Section 705 Masonry Rock
Addition of Section 712 Masonry Joint Material
Addition of Section 722 Miscellaneous Grout Material

All work is further described in the Drawing Sheet BR12 Masonry Rock Details

## REVISION OF SECTION 601
## QC TESTING REQUIREMENTS FOR STRUCTURAL CONCRETE

Section 601 of the Standard Specifications is hereby revised for this project as follows:

Delete the first paragraph of subsection 601.17 and subsection 601.17(a) and replace with the following:

**601.17 Acceptance and Pay Factors.** These provisions apply to all concrete. The Contractor shall sample 601 pay items for both QC and QA in accordance with CP 61. The Engineer will witness the sampling and take possession of the QA samples at a mutually agreed upon location. The Contractor shall be responsible for Quality Control (QC) testing for 601 pay items. QC testing shall be performed at least once per day and then once per 50 cubic yards for concrete slump, unit weight and concrete temperature for each 601 pay item.

(a) *Air Content*. The first three batches at the beginning of each day's production for each 601 pay item shall be tested by the Contractor's QC and CDOT's QA for air content. When the QC and QA air content measurements differ by more than 0.5 percent, both the QC and QA air meters shall be checked in accordance with ASTM C 231. When air content is below the specified limit, it may be adjusted in accordance with subsection 601.08. Successive batches shall be tested by the Contractor's QC and witnessed by the Engineer until three consecutive batches are within specified limits. After the first three batches, CDOT will follow the random minimum testing schedule. After the first three batches the Contractor shall perform QC testing at a frequency of one random sample per 50 cubic yards. Air content shall not be adjusted after a CDOT QA test.

Subsection 601.19 shall include the following:

The Contractor's QC testing will not be measured and paid separately, but shall be included in the work.

**REVISION OF CDOT SECTIONS 601 AND 708**
**STRUCTURAL CONCRETE STAIN**

Section 601 and 708 of the Standard Specifications are hereby revised to include the following:

Subsection 601.01 is revised to include the following:

This work consists of: (1) Class 2 surface finish of concrete to receive Concrete Stain; (2) providing and applying an opaque structural concrete stain to all concrete surfaces previously designated in the Contract to receive a structure concrete stain; and (3) provide up to 5-gallons of pre-mixed touch-up paint in aerosol spray cans.

The structural concrete stain shall be one of the following products or approved equals:

5760 Structural Concrete Stain
Silicone / Acrylic
Exterior Stain / Sealer

Manufactured by KWAL Paint Company
2939 N Hancock Ave.
Colorado Springs, CO
719 205 3216

Subsection 601.03 is revised to include the following:

Structural Concrete Stain 708.08.

Subsection 601.09(f) is revised to include the following:

All concrete forms shall be treated with a water based concrete form release agent prior to placing reinforcement for surfaces to which structural concrete stain is to be applied.

Subsection 601.14 (a), third paragraph, is deleted and replaced with the following:

Structural concrete stain shall be the final finish for all concrete surfaces designated on the plans and in these specifications.

Subsection 601.14(b)4 is deleted and replaced with the following:

Unless otherwise shown in the Contract, the structural concrete stain shall be applied to all exposed concrete elements of the structure above the ground line, and shall extend 1-foot below the finished ground line. Bridge bearing devices, curb and barrier cover plates, fence, and steel bridge rail components shall be masked or otherwise protected to prevent structural concrete stain from coming into contact with them.

The color of the Structural Concrete Stain shall have the written approval of the Engineer prior to final batching and application on the project. The final color of the approved structural concrete stain shall be determined as follows:

1. A 1-foot by 1-foot sample of the color required by the Contract shall be submitted to the Engineer for approval. The stain sample shall be applied to a surface similar in texture to the concrete surface on which the stain will be applied on the project. The stain sample shall be applied by the same methods to be used in field application.

2. At least three weeks prior to beginning of the application of the structural concrete stain, a 10-foot by to-foot (100 square foot) test panel shall be prepared for final color approval. The test panel shall

be produced on the actual concrete surface on which the final product will be placed, at a location recommended by the Contractor and approved by the Engineer. The stain shall be applied to the test panels by the same methods to be used in the final field application. The Engineer will be allowed three business days for the stain to dry after stain application to the test panels and to issue approval.

Concrete finishing and curing shall be completed in accordance with the specification prior to the application of the stain. The concrete finish to which the structural concrete stain is to be applied shall be a Class 2 Finish, except as modified below:

1. Following curing of the concrete in accordance with Subsection 601.13, all projections and bulges shall be removed and the surface sandblasted. Sandblasting shall profile the concrete surface, remove all form release agents, and all other deleterious materials that would inhibit the bond of the Structural Concrete Stain. The profile of the sandblasted concrete surface shall be equivalent to Concrete Surface Profile Three (CSP 3) as defined in Technical Guideline No. 03732, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays” by the International Concrete Repair Institute. The Contractor shall provide a CSP 3 chip for use on the project.

2. A mortar mix, proportioned by volume, consisting of one part portland cement, two to three parts sand (conforming to the requirements of ASTM C 144), and an approved bonding agent shall be used to patch all holes produced by form ties, honeycombing, voids 1/2 inch or larger in any dimension, broken corners and edges, and other defects. The mortar mix shall include an approved bonding agent. The quantity and application procedure of the bonding agent shall be in accordance with the recommendations of the manufacturer of the bonding agent. Areas to be patched shall be moistened with water before the mortar is applied, and the patched area, shall be float finished and left flush with the concrete surface without checking or cracking of patches. Patching shall be done when the ambient temperature is at least 40°F. Holes deeper than 3/4 inch shall be filled in layers that does not exceed 1/2 inch in thickness.

3. Within 24 hours prior to applying structural concrete stain, the concrete surface to be coated shall be cleaned by water blasting at a minimum pressure of 3,000 psi and at a rate of 4 to 14 gallons/minute, to remove dust, dirt, and other materials that would inhibit bonding of the coating. If the surface is contaminated before application of the coating, it shall be re-cleaned as required prior to application of the coating. New concrete shall be at least 28 Days old or as approved in writing by the coating manufacturer before the stain is applied. Two coats of stain shall be applied. Each coat shall be applied at a rate of 200 to 250 square feet per gallon. (Approximately 3 mils dry film thickness.) The second coat shall not be applied until at least 12 hours after the application of the first coat.

If the surface is contaminated between coats it shall be re-cleaned as stated above prior to application of the next coat.

The stain shall be mixed mechanically and applied by spraying. Workmanship shall be such that the final stained surface is colored uniformly and presents a pleasing appearance. Any areas determined by the Engineer to be insufficiently stained shall be re-stained. The stain shall be applied only when the ambient temperature is between 40°F and 90°F, and is anticipated to remain above 40°F for a minimum of twenty-four hours. The surface to be stained shall be dry and free of frost.

Subsection 708.08 is revised to include the following:

708.08 Structural Concrete Stain: The Stain shall be a one-component, non-vapor barrier, solvent based acrylic resin. No sand or other texturing agents will be permitted.

PHYSICAL PROPERTIES
Solid by Weight: 51%, plus or minus 2%
Solids by Volume: 34%, plus or minus 2%

A material safety data sheet (MSDS) prepared in accordance with Federal Standard 313 and a complete set of manufacturers mixing and application instructions shall be submitted to the Engineer before the Contractor begins applying the Stain.

## REVISION OF CDOT SECTION 602
## REINFORCING STEEL

Section 602 of the Standard Specifications is hereby revised to include the following:

Subsection 602.03 is deleted, and replaced with the following:

**602.03 Bar List.** Six copies of a list of all reinforcing steel and bending diagrams shall be furnished to the Engineer, as described under City of Colorado Springs Section 108, Shop Drawings and Submittals. The Contractor shall be responsible for the accuracy of the lists and for furnishing and placing all reinforcing steel in accordance with the details shown on the plans.

**REVISION OF CDOT SECTION 606**
**BRIDGE RAIL**

Section 606 of the Standard Specifications is hereby revised for this project as follows:

Delete the first paragraph of Subsection 606.01, and replace with the following:

This work consists of the construction of guardrail and bridge rail in accordance with these specifications and in conformity with the lines, grades, and special details shown on the plans or established.

## REVISION OF CDOT SECTION 607
## FENCE (PLASTIC)

Standard Specification 607 – Fences shall be deleted in its entirety and replaced with the following:

**607.01 Description**

Fence (Plastic) is a specialty type of temporary fence placed within the limits of a construction project and used to identify the location of sensitive biologic resources while establishing a visible boundary. Orange fabric is used to ensure contractor personnel awareness of the environmentally-sensitive location. Signs are required for the Fence (Plastic).

The Contractor shall place the boundaries of the fence with approval from the Engineer.

If Fence (Plastic) is shown in the plans for wetlands delineation:

1. The boundaries shown are approximate; the Contractor shall mark the exact boundaries on the ground with the approval of the Engineer
2. The Contractor shall not enter the area unless authorized
3. If the fenced area is breached, the Contractor shall immediately:
    - 3.1. Secure the area and stop all operations within 60 feet of the fenced area
    - 3.2. Notify the Engineer
4. If the fenced area is damaged, the Engineer shall determine what efforts are necessary to remedy the damage and who performs the remedy; the Contractor shall be responsible for remedies and charges

**607.02 Materials**

High visibility fabric for Fence (Plastic) must:

1. Contain ultraviolet inhibitors
2. Comply with the properties in the following table:

| | | |
|---|---|---|
| Width, inches, min | Measured | 48 |
| Opening size, inches | Measured | 1 by 1 inch (min) 2 by 4 inches (max) |
| Color | Observed | Orange |
| Roll weight, lb, min for 4 by 100 foot roll | Measured | 12 |
| Tensile strength, lb, min | ASTM D4595 | 320 |

Posts for Fence (Plastic) must be wood or steel. Wood and metal posts for Fence (Plastic) must comply with CDOT Section 710. Wood posts must be at least 2 by 2 inches in size and 6 feet long. Metal posts must be at least 6 feet long.

Signs for Fence (Plastic) must be:

1. Weatherproof and fade-proof and may include plastic laminated printed paper affixed to an inflexible weatherproof backer board
2. Attached to the high visibility fabric with tie wire or locking plastic fasteners

**607.03 Construction**

1. Install Fence (Plastic) with high visibility fabric, posts, and fasteners as follows:
    - 1.1 If wood posts are used, fasteners must be staples or nails
    - 1.2. If steel posts are used, fasteners must be tie wires or locking plastic fasteners
    - 1.3. Spacing of the fasteners must be no more than 8 inches apart
2. Before clearing and grubbing activities
3. From outside of the protected area
4. With posts spaced 8 feet apart and embedded at least 16 inches in the soil

Signs must be attached with the top of the sign panel flush with the top of the high visibility fabric and placed 100 feet apart along the length and at each end of the fence.

If trees and other plants need protection, install the fence to enclose the drip line of the foliage canopy of protected plants and protect visible roots from encroachment.

**607.04 Maintenance**
Maintain Fence (Plastic) by:

1. Keeping posts in a vertical position
2. Reattaching fabric to posts
3. Replacing damaged sections of fabric
4. Replacing and securing signs

**REVISION OF CDOT SECTION 610**
**LANDSCAPE ROCK**

Section 610 of the Standard Specification is hereby revised:

Delete Section 610.01, Description, and replace with the following:

> This work consists of the construction of landscape rock on slope area, or over other areas designated, in accordance with these specifications and in conformity with the lines and grades shown on the plans or established.

Add the following to Section 610.02, Materials:

> Landscape Rock (1 1/2") shall be average 1 1/2" river rock (or similar), and shall be hard, durable stone, washed free of loam, sand, clay, and other foreign substances. Contractor shall submit a five-gallon bucket sample prior to ordering for approval by the Engineer.

Delete Section 610.03 (c), of the Construction Requirements:

Add the following to Section 610.03, Construction Requirements:

> (c) *Landscape Rock (1 1/2")*. Prior to placing the Landscape Rock (1 1/2"), a weed barrier shall be installed. Landscape Rock (1 1/2") shall be placed to a minimum depth of 3 inches over the weed barrier (filter fabric), with a level top surface.

## REVISION OF CDOT SECTION 620
## FIELD OFFICE

Section 620 of the Standard Specifications is hereby revised for this project as follows:

The Field Office provided for the Engineer shall meet the minimum size and equipment requirements of CDOT Field Office Class 2, including at least 600 square feet with provisions for working spaces and an area for meetings to be held. Working restroom facilities shall also be provided. A field office shall be provided throughout the duration of the project. No additional payment will be made for relocating the field office or establishing a new field office location during later project phases.

In subsection 620.02 (2), first paragraph shall include the following:

Copier provided shall be capable of connection to a computer network and function as a color printer and scanner for 8 ½ x 11 inch and 11 x 17 inch paper.

In subsection 620.02, add the following:

(4) *Internet Access*. The Contractor shall provide internet service to the project office. The internet access shall be of sufficient bandwidth to provide high speed connection to the internet to allow large electronic file transfer.

**REVISION OF CDOT SECTION 625**
**CONSTRUCTION SURVEYING**

Section 625 of the Standard Specifications is hereby revised to include the following:

Subsection 625.02, Materials and Equipment, shall be modified by deleting the last sentence in the section, “Traffic Control shall be in accordance with the requirements of Section 630” and replaced with the following:

Traffic Control shall be in accordance with the requirements of City of Colorado Springs Engineering Division Standards Specifications Section 800 as revised herein.

Section 625 shall be modified to include the following:

Construction Surveying shall complete a check of the survey control and shall provide data confirming the check and/or identifying issues and/or discrepancies between the two.

## REVISION OF CDOT SECTION 626
## MOBILIZATION

Section 626 of the CDOT Standard Specifications is hereby replaced with the following:

This item shall consist of the mobilization of equipment and facilities to the project site and construction traffic control items in preparation for work to be done under this Contract. Equipment shall consist of machinery needed to accomplish the activities required to construct items described under the various bid items. Facilities shall consist of mobile shelters used to perform administrative functions, and trailers used to perform equipment maintenance functions, portable toilets, and fuel storage tanks. Expenditures required to connect facilities to various public utility services can be included. Not included are expendable supplies such as fuel, lubricants, and spare parts. Also not included are the materials which become a part of permanent physical features constructed under the Contract. Mobilization shall also include the Contractor Staging Area(s). Seeding of the Staging Area will be paid for under the Seeding item.

Permitting coordination will include all necessary coordination to secure permits for construction activities affecting temporary air and water pollution, soil erosion, and siltation control. Permits include, but are not limited to, Stormwater Discharge Permit (which includes developing a Stormwater Management Plan and Erosion Control Plan), Construction Dewatering Permit (which includes monitoring of outfalls), and file a Construction Air Permit Application (which includes a Fugitive Dust Control Plan).

## REVISION OF CDOT SECTION 712
## GEOTEXTILES

Section 712 of the Standard Specifications is hereby revised for this project as follows:

In subsection 712.08, delete the third and fourth paragraphs and replace with the following:

Physical requirements for all geotextiles shall conform to the requirements of AASHTO M-288. Materials shall be selected from the New York Department of Transportation's Approved Products List of Geosynthetic materials that meet the National Transportation Product Evaluation Program (NTPEP) and AASHTO M-288 testing requirements. The current list of products that meet these requirements is located at:

www.dot.ny.gov

The Geotextile Approved Products List may be accessed by clicking on the following tabs once on the NYDOT site to:

(1) A To Z Site Index
(2) Approved List
(3) Approved Products
(4) Materials and Equipment
(5) Geosynthetics for Highway Construction
(6) Geotextiles

In subsection 712.08, delete Table 712-2 and replace with the following

**Table 712-2**
**TYPICAL VALUES OF PERMEABILITY COEFFICIENTS[1]**

| Turbulent Flow | Particle Size Range Millimeters (inches) | | Effective Size | Permeability Coefficient k cm/s |
|---|---|---|---|---|
| | D max | D min | D 20 mm (inches) | |
| Derrick STONE | 3000 (120) | 900 (36) | 1200 (48) | 100 |
| One-man STONE | 300 (12) | 100 (4) | 150 (6) | 30 |
| Clean, fine to coarse GRAVEL | 80 (3) | 10 (¼) | 13 (½) | 10 |
| Fine, uniform GRAVEL | 8 (⅜) | 1.5 ($^1/_{16}$) | 3 (⅛) | 5 |
| Very coarse, clean, uniform SAND | 3 (⅛) | 0.8 ($^1/_{32}$) | 1.5 ($^1/_{16}$) | 3 |
| **Laminar Flow** | | | | |
| Uniform, coarse SAND | 2 (⅛) | 0.5 ($^1/_{64}$) | 0.6 | 0.4 |
| Uniform, medium SAND | 0.5 | 0.25 | 0.3 | 0.1 |
| Clean, well-graded SAND & GRAVEL | 10 | 0.05 | 0.1 | 0.01 |
| Uniform, fine SAND | 0.25 | 0.05 | 0.06 | $40 \times 10^{-4}$ |
| Well-graded, silty SAND & GRAVEL | 5 | 0.01 | 0.02 | $4 \times 10^{-4}$ |
| Silty SAND | 2 | 0.005 | 0.01 | $1.0 \times 10^{-4}$ |
| Uniform SILT | 0.05 | 0.005 | 0.006 | $0.5 \times 10^{-4}$ |
| Sandy CLAY | 1.0 | 0.001 | 0.002 | $0.05 \times 10^{-4}$ |
| Silty CLAY | 0.05 | 0.001 | 0.0015 | $0.01 \times 10^{-4}$ |
| CLAY (30% to 50% clay sizes) | 0.05 | 0.0005 | 0.0008 | $0.001 \times 10^{-4}$ |
| Colloidal CLAY (-2 µm 50%) | 0.01 | 10 | 40 | $10^{-9}$ |

[1] Basic Soils Engineering, R.K. Hough, 2nd Edition, Ronald Pess Co.; 1969, Page 76.

Note: Since the permeability coefficient of the soil will be unknown in most non-critical, non-severe applications for erosion control and drainage, the soil-permeability coefficients listed in Table 712-2 may be used as a guide for comparing the permeability coefficient of the fabric with that of the in-place soil

## 10.3 CDOT STANDARD SPECIAL PROVISIONS

The 2011 Standard Specifications for Road and Bridge Construction controls construction of this project. The following special provisions supplement or modify the Standard Specifications and take precedence over the Standard Specifications and plans.

| Index Pages | Date | # Pages |
|---|---|---|
| Revision of Sections 101 and 630 - Construction Zone Traffic Control | (April 30, 2015) | 2 |
| Revision of Section 102 - Contents of Proposal Forms | (April 9, 2015) | 1 |
| Revision of Section 105 – Construction Surveying | (July 31, 2014) | 1 |
| Revision of Section 105 – Disputes and Claims for Contract Adjustments | (November 6, 2014) | 31 |
| Revision of Section 105 – Violation of Working Time Limitation | (February 3, 2011) | 1 |
| Revision of Section 106 - Buy America Requirements | (November 6, 2014) | 1 |
| Revision of Section 106 – Certificates of Compliance and Certified Test Reports | (February 3, 2011) | 1 |
| Revision of Section 106 – Material Sources | (October 31, 2013) | 1 |
| Revision of Section 106 – Supplier List | (January 30, 2014) | 1 |
| Revision of Sections 106, 627 and 713 - Glass Beads for Pavement Marking | (February 8, 2013) | 2 |
| Revision of Section 107 – Project Payrolls | (May 2, 2013) | 1 |
| Revision of Section 107 - Responsibility for Damage Claims, Insurance Types, and Coverage Limits | (February 3, 2011) | 1 |
| Revision of Section 107 – Warning Lights for Work Vehicles and Equipment | (January 30, 2014) | 1 |
| Revision of Sections 107 and 208 – Water Quality Control, Under One Acre of Disturbance | (April 30, 2015) | 4 |
| Revision of Section 108 - Delay and Extension of Contract Time | (April 30, 2015) | 2 |
| Revision of Section 108 – Liquidated Damages | (June 4, 2015) | 1 |
| Revision of Section 108 – Notice to Proceed | (July 31, 2014) | 1 |
| Revision of Section 108 – Project Schedule | (July 31, 2014) | 6 |
| Revision of Section 108 – Subletting of Contract | (January 31, 2013) | 1 |
| Revision of Section 108 - Payment Schedule (Single Fiscal Year) | (April 30, 2015) | 1 |
| Revision of Section 109 - Compensation for Compensable Delays | (May 5, 2011) | 1 |
| Revision of Section 109 – Measurement of Quantities | (February 3, 2011) | 1 |
| Revision of Section 109 – Measurement of Water | (January 06, 2012) | 1 |
| Revision of Section 109 – Prompt Payment | (January 31, 2013) | 1 |
| Revision of Section 203 – Imported Material for Embankment | (February 3, 2011) | 2 |
| Revision of Sections 203, 206, 304 and 613 - Compaction | (July 19, 2012) | 2 |
| Revision of Section 206 – Imported Material for Structure Backfill | (July 19, 2012) | 2 |
| Revision of Section 206 – Structure Backfill (Flow-Fill) | (April 26, 2012) | 2 |
| Revision of Section 206 – Structure Backfill at Bridge Abutments | (January 30, 2014) | 1 |
| Revision of Sections 206 and 601 – Backfilling Structures that Support Lateral Earth Pressures | (July 29, 2011) | 1 |
| Revision of Section 212 – Seed | (April 26, 2012) | 1 |
| Revision of Section 213 – Mulching | (January 31, 2013) | 4 |
| Revision of Section 216 – Soil Retention Covering | (July 16, 2015) | 6 |
| Revision of Section 250 – Environmental, Health and Safety Management | (January 15, 2015) | 14 |
| Revision of Sections 412, 601, and 711 - Liquid Membrane-Forming Compounds for Curing Concrete | (May 5, 2011) | 1 |
| Revision of Section 512 – Bearing Device Testing | (November 6, 2014) | 1 |

| | | |
|---|---|---|
| Revision of Section 518 - Bridge Expansion Device | (October 31, 2013) | 1 |
| Revision of Section 601 – Concrete Batching | (February 3, 2011) | 1 |
| Revision of Section 601 – Concrete Finishing | (February 3, 2011) | 1 |
| Revision of Section 601 – Concrete Form and Falsework Removal | (July 28, 2011) | 2 |
| Revision of Section 601 – Concrete Slump Acceptance | (July 29, 2011) | 1 |
| Revision of Section 601 - Entrained Air of Class BZ Concrete | (April 30, 2015) | 1 |
| Revision of Section 601 - QC Testing Requirements for Structural Concrete | (May 8, 2014) | 1 |
| Revision of Section 601 - Structural Concrete Strength Acceptance | (April 30, 2015) | 1 |
| Revision of Section 601 and 701 – Cements and Pozzolans | (November 6, 2014) | 4 |
| Revision of Section 603 - Culvert Pipe Inspection | (October 2, 2014) | 1 |
| Revision of Sections 603, 624, 705 and 712 - Drainage Pipe | (April 30, 2015) | 3 |
| Revision of Section 618 – Prestressed Concrete | (April 26, 2012) | 24 |
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| Revision of Section 703 - Aggregate for Bases (Without RAP) | (October 31, 2013) | 1 |
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| Revision of Section 712 – Water for Mixing or Curing Concrete | (February 3, 2011) | 1 |
| Revision of Section 713 - Epoxy Pavement Marking | (January 15, 2015) | 2 |
| Affirmative Action Requirements – Equal Employment Opportunity | (February 3, 2011) | 10 |
| Disadvantaged Business Enterprise (DBE) Requirements | (Dec. 26, 2013) | 9 |
| Minimum Wages, Colorado, U.S. Department of Labor General Decision Number CO140018, MOD 1, Highway Construction for El Paso, Pueblo, and Teller counties. | (June 5, 2015) | 6 |
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| Required Contract Provisions – Federal-Aid Construction Contracts | (October 31, 2013) | 14 |
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**REVISIONS OF SECTION 101 AND 630**
**CONSTRUCTION ZONE TRAFFIC CONTROL**

Sections 101 and 630 of the Standard Specifications are hereby revised for this project as follows:

In subsection 101.01 add the following:

MASH Manual for Assessing Safety Hardware

In subsection 630.01, delete the first paragraph and replace with the following:

**630.01** This work consists of furnishing, installing, moving, maintaining, and removing temporary traffic signs, advance warning arrow panels, flashing beacon (portable), barricades, channelizing devices, delineators, temporary traffic signals, mobile pavement marking zones, masking and unmasking existing signs in construction zones, and concrete barriers as required by the Manual on Uniform Traffic Control Devices for Streets and Highways and the Colorado Supplement thereto, in accordance with the Contract. Devices shall comply with the performance criteria contained in NCHRP Report 350 (only applicable for devices developed prior to 2011) or MASH (acceptable for all devices). Devices temporarily not in use shall, as a minimum, be removed from the shoulder area. Moving will include devices removed from the project and later returned to use.

In subsection 630.02, delete the second paragraph, and replace with the following:

Temporary sign support assembly shall be timber, perforated square metal tubing inserted into a larger base post or slip base or perforated metal U-channel with a slip base. The temporary sign support assembly shall conform to NCHRP (only applicable for sign support assemblies developed prior to 2011) or MASH (acceptable for all sign support assemblies), and AASHTO requirements regarding temporary sign supports during construction.

Subsection 630.02 shall include the following:

If a timber post is selected, it shall conform to the requirements of subsection 614.02.

In subsection 630.07(a), delete the first paragraph and replace with the following:

(a) *Stackable Vertical Panels***.** Stackable vertical panels shall comply with the crash test requirements contained in NCHRP Report 350 (only applicable for vertical panels developed prior to 2011) or MASH (acceptable for all vertical panels) and shall meet MUTCD requirements for vertical panels. Vertical panels shall be retroreflectorized with Type IV sheeting, in accordance with subsection 630.02. The stackable vertical panels shall have the following properties:

In subsection 630.07(b), delete the first paragraph and replace with the following:

(b) *Stackable Tubular Markers.* Stackable tubular markers shall comply with the crash test requirements contained in NCHRP Report 350 (only applicable for stackable tubular markers developed prior to 2011) or MASH (acceptable for all stackable tubular markers) and shall conform to MUTCD requirements for Tubular Markers. The stackable tubular markers shall have the following properties:

In subsection 630.09, delete the second and third paragraphs, and replace with the following:

Work zone devices designated by FHWA as Category I, II, or III, shall comply with the performance criteria contained in NCHRP Report 350 (only applicable for devices developed prior to 2011) or MASH (acceptable for all devices). Devices designated as Category IV, including but not limited to portable or trailer-mounted devices such as flashing arrow panels, temporary traffic signals, area lighting supports, and changeable message signs are not required to meet NCHRP 350 or MASH requirements.

Except for Category IV devices, the Contractor shall obtain and present to the Engineer the manufacturer's written NCHRP 350 (only applicable for devices developed prior to 2011) or MASH (acceptable for all devices) certification for each work zone device before it is first used on the project.

In subsection 630.10(a) (3) (iii), delete the third paragraph, and replace with the following:

Groups 1 and 2 shall each be equipped with a truck-mounted Advance Warning Flashing or Sequencing Arrow Panel (C Type), and a truck mounted impact attenuator. The impact attenuator shall be located on the rearmost vehicle of each group. A separate vehicle for this attenuator may be used. Each truck-mounted impact attenuator shall be certified by the manufacturer to be able to withstand a 62 MPH impact in accordance with NCHRP 350, Test Level 3 (only applicable for truck-mounted impact attenuators developed prior to 2011) or MASH, Test Level 3 (acceptable for all truck-mounted impact attenuators). The cone setting truck and the cone pickup truck shall not be the same vehicle.

In subsection 630.16, delete the 5th paragraph.

**REVISION OF SECTION 102**
**CONTENTS OF PROPOSAL FORMS**

Section 102 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 102.02 and replace with the following:

**102.02 Contents of Proposal Forms.** The Department will publish bidding opportunities to perspective bidders on the CDOT Business Center web site. The forms on this web site will state the location and description of the contemplated construction and will show the estimate of the various quantities and types of work to be performed or materials to be furnished, and will have a schedule of items for which unit bid prices are invited. The proposal form will state the time in which the project must be completed, the amount of the proposal guaranty, and the date, time and place of the opening of proposals.

All bidders on projects shall submit electronic bids only. Innovative delivery method projects such as Design-Build, CMGC and Best Value, are not subject to this electronic bidding requirement.

The plans, specifications, and other documents designated in the proposal form, will be considered a part of the proposal.

The prospective bidder shall pay the Department the sum stated in the Invitation for Bids for each set of plans.

**REVISION OF SECTION 105**
**CONSTRUCTION SURVEYING**

Section 105 of the Standard Specifications is hereby revised for this project as follows:

In subsection 105.13, delete (a) and replace with the following:

(a) *Contractor Surveying*. When the bid schedule contains pay item 625, Construction Surveying, the Department will provide control points and bench marks as described in the Contract. The Contractor shall furnish and set construction stakes establishing lines and grades in accordance with the provisions of Section 625. The Engineer may order extra surveying which will be paid for at a negotiated rate not to exceed $150 per hour.

In subsection 105.13 (b), delete the sixth paragraph and replace with the following:

The Contractor shall be held responsible for the preservation of all stakes and marks, and if any are destroyed, disturbed or removed by the Contractor, subcontractors, or suppliers, the cost of replacing them will be charged against the Contractor and will be deducted from the payment for the work at a negotiated rate not to exceed $150 per hour.

**REVISION OF SECTION 105**
**DISPUTES AND CLAIMS FOR CONTRACT ADJUSTMENTS**

Section 105 of the Standard Specifications is hereby revised for this project as follows:

Delete subsections 105.22, 105.23 and 105.24 and replace with the following:

**105.22 Dispute Resolution.** Subsections 105.22, 105.23, and 105.24 detail the process through which the parties (CDOT and the Contractor) agree to resolve any issue that may result in a dispute. The intent of the process is to resolve issues early, efficiently, and as close to the project level as possible. Figure 105-1 in the standard special provisions outlines the process. Specified time frames may be extended by mutual agreement of the Engineer and the Contractor. In these subsections, when a time frame ends on a Saturday, Sunday or holiday, the time frame shall be extended to the next scheduled work day.

A dispute is a disagreement concerning contract price, time, interpretation of the Contract, or all three between the parties at the project level regarding or relating to the Contract. Disputes include, but are not limited to, any disagreement resulting from a delay, a change order, another written order, or an oral order from the Project Engineer, including any direction, instruction, interpretation, or determination by the Project Engineer, interpretations of the Contract provisions, plans, or specifications or the existence of alleged differing site conditions.

The term "merit" refers to the right of a party to recover on a claim or dispute, irrespective of quantum, based on the substance, elements, and grounds of that claim or dispute. The term "quantum" refers to the quantity or amount of compensation or time deserved when a claim or dispute is found to have merit.

Disputes from subcontractors, material suppliers, or any other entity not party to the Contract shall be submitted through the Contractor. Review of a pass-through dispute does not create privity of Contract between CDOT and the subcontractor.

If CDOT does not respond within the specified timelines, the Contractor may advance the dispute to the next level.

When the Project Engineer is a Consultant Project Engineer, actions, decisions, and determinations specified herein as made by the Project Engineer shall be made by the Resident Engineer.

The dispute resolution process set forth in this subsection shall be exhausted in its entirety prior to initiation of litigation or arbitration. Failure to comply with the requirements set forth in this subsection shall bar either party from any further administrative, equitable, or legal remedy. If a deadline is missed that does not prejudice either party, further relief shall be allowed.

All disputes and claims shall be submitted within 30 days of the date of the certified letter submitting the CDOT Form 96, Contractor Acceptance of Final Estimate, to the Contractor.

When a project has a landscape maintenance period, the Project Engineer will grant partial acceptance in accordance with subsection 105.21(a). This partial acceptance will be project acceptance of all the construction work performed prior to this partial acceptance. All disputes and claims related to the work in which this partial acceptance is granted shall be submitted within 30 days of the Project Engineer's partial acceptance.

Failure to provide notification of a dispute or claim within the time periods listed above releases the State of Colorado from all disputes and claims for which notice has not already been submitted in accordance with the Contract.

All disputes and claims seeking damages calculated on a Total Cost or Modified Total Cost basis will not be considered unless the party asserting such damages establishes all the legal requirements therefore, which include:

(1) The nature of the particular losses makes it impossible or highly impractical to determine them with a reasonable degree of accuracy.

(2) The Contractor's bid or estimate was realistic.

(3) The Contractor's actual costs were reasonable.

(4) The Contractor was not responsible for the cost overrun.

Should the Contractor's dispute use the Total Cost approach for calculating damages, damages will be determined by subtracting the contract amount from the total cost of performance. Should the Contractor's dispute use the Modified Total Cost approach for calculating damages, if the Contractor's bid was unrealistic in part, and/or some of its costs were unreasonable and/or some of its damages were caused by its own errors, those costs and damages will be deducted from the total cost of performance to arrive at the Modified Total Cost. The Total Cost or Modified Total Cost basis for calculating damages shall not be available for any disputes or claims seeking damages where the Contractor could have kept separate cost records at the time the dispute arose as described in subsection 105.22(a).

(a) *Document Retention*. The Contractor shall keep full and complete records of the costs and additional time incurred for each dispute for a period of at least three years after the date of final payment or until dispute is resolved, whichever is more. The Contractor, subcontractors, and lower tier subcontractors shall provide adequate facilities, acceptable to the Engineer, for an audit during normal business hours. The Contractor shall permit the Engineer or Department auditor to examine and copy those records and all other records required by the Engineer to determine the facts or contentions involved in the dispute. The Contractor shall identify and segregate any documents or information that the Contractor considers particularly sensitive, such as confidential or proprietary information.

Throughout the dispute, the Contractor and the Project Engineer shall keep complete daily records of extra costs and time incurred, in accordance with the following procedures:

1. Daily records shall identify each operation affected, the specific locations where work is affected, and the potential effect to the project's schedule. Such records shall also reflect all labor, material, and equipment applicable to the affected operations.
2. On the first work day of each week following the date of the written notice of dispute, the Contractor shall provide the Project Engineer with the daily records for the preceding week. If the Contractor's records indicate costs greater than those kept by the Department, the Project Engineer will meet with the Contractor and present his records to the Contractor at the meeting. The Contractor shall notify the Engineer in writing within three work days of any inaccuracies noted in, or disagreements with, the Department's records.

(b) *Initial Dispute Resolution Process*. To initiate the dispute resolution process the Contractor shall provide a written notice of dispute to the Project Engineer upon the failure of the Parties to resolve the issue through negotiation. Disputes will not be considered unless the Contractor has first complied with specified issue resolution processes such as those specified in subsections 104.02, 106.05, 108.08(a), and 108.08(d).

The Contractor shall supplement the written notice of dispute within 15 days with a written Request for Equitable Adjustment (REA) providing the following:

(3) The date of the dispute

(4) The nature of the circumstances which caused the dispute

(5) A statement explaining in detail the specific provisions of the Contract and any basis, legal or factual, which support the dispute.

(6) If any, the estimated quantum, calculated in accordance with methods set forth in subsection 105.24(b)12., of the dispute with supporting documentation

(7) An analysis of the progress schedule showing the schedule change or disruption if the Contractor is asserting a schedule change or disruption.

The Contractor shall submit as much information on the quantum and impacts to the Contract time as is reasonably available with the REA and then supplement the REA as additional information becomes available. If the dispute escalates to the DRB process the DRB shall not hear any issue or consider any information that was not contained in the Request for Equitable Adjustment and fully submitted to the Project Engineer and Resident Engineer during the 105.22 process.

(c) *Project Engineer Review*. Within 15 days after receipt of the REA, the Project Engineer will meet with the Contractor to discuss the merits of the dispute. Within seven days after this meeting, the Project Engineer will issue a written decision on the merits of the dispute.

The Project Engineer will either deny the merits of the dispute or notify the Contractor that the dispute has merit. This determination will include a summary of the relevant facts, Contract provisions supporting the determination, and an evaluation of all scheduling issues that may be involved.

If the dispute is determined to have merit, the Contractor and the Project Engineer will determine the adjustment in payment, schedule, or both within 30 days. When a satisfactory adjustment is determined, it shall be implemented in accordance with subsections 106.05, 108.08, 109.04, 109.05 or 109.10 and the dispute is resolved.

If the Contractor accepts the Project Engineer's denial of the merits of the dispute, the dispute is resolved and no further action will be taken. If the Contractor does not respond in seven days, it will be assumed he has accepted the denial. If the Contractor rejects the Project Engineer's denial of the merits of the dispute or a satisfactory adjustment of payment or schedule cannot be agreed upon within 30 days, the Contractor may further pursue resolution of the dispute by providing written notice to the Resident Engineer within seven days, according to subsection 105.22(d).

(d) *Resident Engineer Review.* Within seven days after receipt of the Contractor's written notice to the Resident Engineer of unsatisfactory resolution of the dispute, the Project Engineer and Resident Engineer will meet with the Contractor to discuss the dispute. Meetings shall continue weekly for a period of up to 30 days and shall include a Contractor's representative with decision authority above the project level.

If these meetings result in resolution of the dispute, the resolution will be implemented in accordance with subsections 108.08, 109.04, 109.05, or 109.10 and the dispute is resolved.

If these meetings do not result in a resolution or the participants mutually agree that they have reached an impasse, the dispute shall be presented to the Dispute Review Board in accordance with subsection 105.23.

**105.23 Dispute Review Board.** A Dispute Review Board (DRB) is an independent third party that will provide specialized expertise in technical areas and administration of construction contracts. The DRB will assist in and facilitate the timely and equitable resolution of disputes between CDOT and the Contractor in an effort to avoid animosity and construction delays, and to resolve disputes as close to the project level as possible. The DRB shall be established and operate as provided herein and shall serve as an independent and impartial board.

There are two types of DRBs: the "On Demand DRB" and the "Standing DRB". The DRB shall be an "On Demand DRB" unless a "Standing DRB" is specified in the Contract. An On Demand DRB shall be established only when the Project Engineer initiates a DRB review in accordance with subsection 105.23(a). A Standing DRB, when specified in the Contract, shall be established at the beginning of the project.

(a) *Initiation of Dispute Review Board Review*. When a dispute has not been resolved in accordance with subsection 105.22, the Project Engineer will initiate the DRB review process within 5 days after the period described in subsection 105.22(d).

(b) *Formation of Dispute Review Board*. DRBs will be established in accordance with the following procedures:

1. CDOT, in conjunction with the Colorado Contractors Association, will maintain a statewide list

of suggested DRB candidates experienced in construction processes and the interpretation of contract documents and the resolution of construction disputes. The Board members shall be experienced in highway and transportation projects. After December 31, 2013 only individuals who have completed training (currently titled DRB Administration & Practice Training) through the Dispute Resolution Board Foundation or otherwise approved by CDOT can be a DRB member. When a DRB is formed, the parties shall execute the agreement set forth in subsection 105.23(l).

2. If the dispute has a value of $250,000 or less, the On Demand DRB shall have one member. The Contractor and CDOT shall select the DRB member and execute the agreement within 30 days of initiating the DRB process. If the parties do not agree on the DRB member, each shall select five candidates. Each party shall numerically rank their list using a scale of one to five with one being their first choice and five being their last choice. If common candidates are listed, but the parties cannot agree, that common candidate with the lowest combined numerical ranking shall be selected. If there is no common candidate, the lists shall be combined and each party shall eliminate three candidates from the list. Each party shall then numerically rank the remaining candidates, with No. 1 being the first choice. The candidate with the lowest combined numerical ranking shall be the DRB member. The CDOT Project Engineer will be responsible for having all parties execute the agreement.

3. If the dispute has a value over $250,000, the On Demand DRB shall have three members. The Contractor and CDOT shall each select a member and those two members shall select a third. Once the third member is approved the three members will nominate one of them to be the Chair and execute the agreement within 45 days of initiating the DRB process.

4. The Standing DRB shall always have three members. The Contractor and CDOT shall each select a member and those two members shall select a third member. Once the third member is approved the three members will nominate one of them to be the Chair.. The Contractor and CDOT shall submit their proposed Standing DRB members within 5 days of execution of the Contract. The third member shall be selected within 15 days of execution of the Contract. Prior to construction starting the parties shall execute the Three Party Agreement. The CDOT Project Engineer will be responsible for having all parties execute the agreement. The Project Engineer will invite the Standing DRB members to the Preconstruction and any Partnering conferences.

5. DRB members shall not have been involved in the administration of the project under consideration. DRB candidates shall disclose to the parties the following relationships:

   (1) Prior employment with either party

   (2) Prior or current financial interests or ties to either party

   (3) Prior or current professional relationships with either party

   (4) Anything else that might bring into question the impartiality or independence of the DRB member

   (5) Prior to agreeing to serve on a DRB, members shall notify all parties of any other CDOT DRB's they are serving or that they will be participating in another DRB.

   If either party objects to the selection of a potential DRB member based on the disclosures of the potential member, that potential member shall not be placed on the Board.

6. There shall be no ex parte communications with the DRB at any time.

7. The service of a Board member may be terminated only by written agreement of both parties.

8. If a Board member resigns, is unable to serve, or is terminated, a new Board member shall be selected within four weeks in the same manner as the Board me member who was removed was originally selected.

(c) *Additional Responsibilities of the Standing Disputes Review Board*

PART 1 - General. Within 120 days after the establishment of the Board, the Board shall meet at a mutually agreeable location to:

SCHEDULE 1 - Obtain copies of the Contract documents and Contractor's schedules for each of the Board members.

SCHEDULE 2 - Agree on the location of future meetings, which shall be reasonably close to the project site.

SCHEDULE 3 - Establish an address and telephone number for each Board member for the purposes of Board business.

PART 2 - Regular meetings. Regular meetings of the Board shall be held approximately every 120 to 180 days throughout the life of the Contract, except that this schedule may be modified to suit developments on the job as the work progresses. Regular meetings shall be attended by representatives of the Contractor and the Department.

PART 3 - The Board shall establish an agenda for each meeting which will cover all items that the Board considers necessary to keep it abreast of the project such as construction status, schedule, potential problems and solutions, status of past claims and disputes, and potential claims and disputes. Copies of each agenda shall be submitted to the Contractor and the Department at least seven days before the meeting date. Oral or written presentations or both shall be made by the Contractor and the Department as necessary to give the Board all the data the Board requires to perform its functions. The Board will prepare minutes of each meeting, circulate them to all participants for comments and approval, and issue revised minutes before the next meeting. As a part of each regular meeting, a field inspection trip of all active segments of the work at the project site may be made by the Board, the Contractor, and the Department.

4. Advisory Opinions

(1) Advisory opinions are typically used soon after the parties find they have a potential dispute and have conducted preliminary negotiations but before expenditure of additional resources and hardening their positions. Advisory opinions provide quick insight into the DRB's likely assessment of the dispute. This process is quick and may be entirely oral and does not prejudice the opportunity for a DRB hearing.
(2) Both parties must agree to seek an advisory opinion and so notify the chairperson. The procedure for requesting and issuing advisory opinions should be discussed with the DRB at the first meeting with the parties.
(3) The DRB may or may not issue a written opinion, but if a written advisory opinion is issued, it must be at the specific request of both parties.
(4) The opinion is only advisory and does not require an acceptance or rejection by either party. If the dispute is not resolved and a hearing is held, the oral presentations and advisory opinion are completely disregarded and the DRB hearing procedure is followed.
(5) Advisory opinions should be limited to merit issues only.

(d) *Arranging a Dispute Review Board Hearing*. When the Project Engineer initiates the DRB review process, the Project Engineer will:

1. Contact the Contractor and the DRB to coordinate an acceptable hearing date and time. The hearing shall be held at the Resident Engineer's office unless an alternative location is agreed to by both parties. Unless otherwise agreed to by both parties the DRB hearing will be held within 30 days after the DRB agreement is signed by the CDOT Chief Engineer.
2. Ensure DRB members have copies of all documents previously prepared by the Contractor and CDOT pertaining to the dispute, the DRB request, the Contract documents, and the special provisions at least two weeks before the hearing.

(e) *Pre-Hearing Submittal*: At least fifteen days prior to the hearing, CDOT and the Contractor shall submit by e-mail to the DRB Chairperson their parties pre-hearing position paper. The DRB Chairperson shall simultaneously distribute by e-mail the pre-hearing position papers to all parties and other DRB members, if any. At the same time, each party shall submit a copy of all its supporting documents to be used at the hearing to all DRB Members and the other party unless the parties have agreed to a common set of documents as discussed in #2 below. In this case,

CDOT shall submit the common set of documents to the Board and the Contractor. The pre-hearing position paper shall contain the following:

1. A joint statement of the dispute, and the scope of the desired decision. The joint statement shall summarize in a few sentences the nature of the dispute. If the parties are unable to agree on the wording of the joint statement, each party's position paper shall contain both statements, and identify the party
authoring each statement. The parties shall agree upon a joint statement at least 20 days prior to the hearing and submit it to the DRB or each party's independent statement shall be submitted to the DRB and the other party at least 20 days prior to the hearing.

2. The basis and justification for the party's position, with reference to specific contract language and other supporting documents for each element of the dispute. To minimize duplication and repetitiveness, the parties may identify a common set of documents that will be referred to by both parties and submit them in a separate package to the DRB. The engineer will provide a hard copy of the project plans and Project and Standard Special Provisions, if necessary, to the DRB. Other standard CDOT documents such as Standard Specifications and M&S Standards are available on the CDOT website.

   (1) If any party contends that they are not necessary to the proceedings, the DRB shall determine that issue in the first instance. Should the DRB determine that a dispute does not involve a party, that party shall be relieved from participating in the DRB hearing and paying any further DRB costs.
   (2) When the scope of the hearing includes quantum, the requesting party's position paper shall include full cost details, calculated in accordance with methods set forth in subsection 105.24(b)12. The Scope of the hearing will not include quantum if CDOT has ordered an audit and that audit has not been completed.

3. A list of proposed attendees at the hearing. In the event of any disagreement, the DRB shall make the final determination as to who attends the hearing.

4. A list of any intended experts including their qualifications and a summary of what their presentation will include and an estimate of the length of the presentation.

The number of copies, distribution requirements, and time for submittal shall be established by the DRB and communicated to the parties by the Chairperson.

A pre-hearing phone conference with all DRB members and the parties shall be conducted as soon as a hearing date is established but no later than 10 days prior to the hearing. The DRB Chairperson shall explain the specifics of how the hearing will be conducted including how the two parties will present their information to the DRB (Ex: Each party makes a full presentation of their position or presentations will be made on a "point by point" basis with each party making a presentation only on an individual dispute issue before moving onto to the next issue). If the pre-hearing position papers and documents have been received by the Board prior to the conference call, the DRB Chairperson shall at this conference discuss the estimated hours of review and research activities for this dispute (such as time spent evaluating and preparing recommendations on specific issues presented to the DRB). If the pre-hearing position papers and documents have not been received by the Board prior to the conference call, another conference call will be scheduled during the initial conference call to discuss the estimated hours of review. Compensation for time agreed to in advance by the parties will be made at an agreed rate of $125 per hour in accordance with subsection 105.23 (k) 2. Compensation for the phone conference time will also be made at an agreed to rate of $125 per hour in accordance with subsection 105.23 (k) 2. The Engineer shall coordinate the phone conference.

(f) *Dispute Review Board Hearing.* The DRB shall preside over a hearing. The chairperson shall control the hearing and conduct it as follows:

a. An employee of CDOT presents a brief description of the project and the status of

construction on the project.

b. The party that requested the DRB presents the dispute in detail as supported by previously submitted information and documentation in the pre-hearing position paper. No new information or disputes will be heard or addressed by the DRB.

c. The other party presents its position in detail as supported by previously submitted information and documentation in the pre-hearing position paper. No new information or disputes will be heard or addressed by the DRB.

d. Employees of each party are responsible for leading presentations at the DRB hearing.

e. Attorneys shall not participate in the hearing unless the DRB specifically addresses an issue to them or unless agreed to by both parties. Should the parties disagree on attorney participation, the DRB shall decide on what, if any, participation will be permitted. Attorneys representing the parties are permitted to attend the hearing, provided their presence has been noted in the pre-hearing submittal.

f. Either party may use experts. A party intending to offer an outside expert's analysis at the hearing shall disclose such intention in the pre-hearing position paper. The expert's name and a general statement of the area of the dispute that will be covered by his presentation shall be included in the disclosure. The other party may present an outside expert to address or respond to those issues that may be raised by the disclosing party's outside expert.

g. If both parties approve, the DRB may retain an outside expert. The DRB chairperson shall include the cost of the outside expert in the DRB's regular invoice. CDOT and the Contractor shall equally bear the cost of the services of the outside expert employed by the DRB.

h. Upon completion of their presentations and rebuttals, both parties and the DRB will be provided the opportunity to exchange questions and answers. All questions shall be directed to the chairperson first. Attendees may respond only when board members request a response.

i. The DRB shall hear only those disputes identified in the written request for the DRB and the information contained in the pre-hearing submittals. The board shall not hear or address other disputes. If either party attempts to discuss a dispute other than those to be heard by the DRB or attempts to submit new information, the chairperson shall inform such party that the board shall not hear the issue and shall not accept any additional information. The DRB shall not hear any issue or consider any information that was not contained in the Request for Equitable Adjustment and fully submitted to the Project Engineer and Resident Engineer during the 105.22 process.

j. If either party fails to timely deliver a position paper, the DRB may reschedule the hearing one time. On the final date and time established for the hearing, the DRB shall proceed with the hearing using the information that has been submitted.

k. If a party fails to appear at the hearing, the DRB shall proceed as if all parties were in attendance.

(g) *Dispute Review Board Recommendation*. The DRB shall issue a Recommendation in accordance with the following procedures:

1. The DRB shall not make a recommendation on the dispute at the meeting. Prior to the closure of the hearing, the DRB members and the Contractor and CDOT together will discuss the time needed for analysis and review of the dispute and the issuance of the DRB's recommendation. The maximum time shall be 30 days unless otherwise agreed to by both parties. At a minimum, the recommendation shall contain all the elements listed in Rule 35, Form of Award, of the Arbitration Regular Track Provisions listed at the end of subsection 105.24.

2. After the meeting has been closed, the DRB shall prepare a written Recommendation signed by each member of the DRB. In the case of a three member DRB, where one member dissents that member shall prepare a written dissent and sign it.

3. The chairperson shall transmit the signed Recommendation and any supporting documents to both parties.

(h) *Clarification and Reconsideration of Recommendation.* Either party may request clarification or reconsideration of a decision within ten days following receipt of the Recommendation. Within ten days after receiving the request, the DRB shall provide written clarification or reconsideration to both parties unless otherwise agreed to by both parties.

Requests for clarification or reconsideration shall be submitted in writing simultaneously to the DRB and to the other party.

The Board shall not accept requests for reconsideration that amount to a renewal of a prior argument or additional argument based on facts available at the time of the hearing. The Board shall not consider any documents or arguments which have not been made a part of the pre-hearing submittal other than clarification and data supporting previously submitted documentation.

Only one request for clarification or reconsideration per dispute from each party will be allowed.

(i) *Acceptance or Rejection of Recommendation.* CDOT and the Contractor shall submit their written acceptance or rejection of *the* Recommendation, in whole or in part, concurrently to the other party and to the DRB within 14 days after receipt of the Recommendation or following receipt of responses to requests for clarification or reconsideration.

If the parties accept the Recommendation or a discreet part thereof, it will be implemented in accordance with subsections 108.08, 109.04, 109.05, or 109.10 and the dispute is resolved.

If either party rejects the Recommendation in whole or in part, it shall give written explanation to the other party within 14 days after receiving the Recommendation. When the Recommendation is rejected in whole or in part by either party, the other party may either abandon the dispute or pursue a formal claim in accordance with subsection 105.24.

If either party fails to submit its written acceptance or rejection of the Dispute Board's recommendation, according to these specifications, such failure shall constitute that party's acceptance of the Board's recommendation.

(j) *Admissibility of Recommendation*. Recommendations of a DRB issued in accordance with subsection 105.23 are admissible in subsequent proceedings but shall be prefaced with the following paragraph:

This Recommendation may be taken under consideration with the understanding that:

1. The DRB Recommendation was a proceeding based on presentations by the parties.
2. No fact or expert witnesses presented sworn testimony or were subject to cross-examination.
3. The parties to the DRB were not provided with the right to any discovery, such as production of documents or depositions.
4. There is no record of the DRB hearing other than the Recommendation.

(k) *Cost and Payments.*

1. General Administrative Costs. The Contractor and the Department shall equally share the entire cost of the following to support the Board's operation:

   (1) Copies of Contract and other relevant documentation
   (2) Meeting space and facilities
   (3) Secretarial Services
   (4) Telephone
   (5) Mail

(6) Reproduction
(7) Filing

2. The Department and the Contractor shall bear the costs and expenses of the DRB equally. Each DRB board member shall be compensated at an agreed rate of $1,200 per day if time spent on-site per meeting is greater than four hours. Each DRB board member shall be compensated at an agreed rate of $800 per day if time spent on-site per meeting is less than or equal to four hours. The time spent traveling to and from each meeting shall be reimbursed at $50 per hour if the travel distance is more than 50 miles. The agreed daily and travel time rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel of more than 50 miles and incidentals for each day, or portion thereof that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time, (such as time spent evaluating and preparing recommendations on specific issues presented to the DRB), has been specifically agreed to in advance by the Department and Contractor. Time away from the project that has been specifically agreed to in advance by the parties will be compensated at an agreed rate of $125 per hour. The agreed amount of $125 per hour shall include all incidentals. Members serving on more than one DRB, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project.

3. Payments to Board Members and General Administrative Costs. Each Board member shall submit an invoice to the Contractor for fees and applicable expenses incurred each month following a month in which the Board members participated in Board functions. Such invoices shall be in the format established by the Contractor and the Department. The Contractor shall submit to the Department copies of all invoices. No markups by the Contractor will be allowed on any DRB costs. The Department will split the cost by authorizing 50 percent payment on the next progress payment. The Contractor shall make all payments in full to Board members within seven calendar days after receiving payment from the Department for this work.

(l) *Dispute Review Board Three Party Agreement.*

DISPUTE REVIEW BOARD

THREE PARTY AGREEMENT
COLORADO PROJECT NO._____

THIS THREE PARTY AGREEMENT, made as of the date signed by the Chief Engineer below, by and between: the Colorado Department of Transportation, hereinafter called the "Department"; and

_____
_____,
hereinafter called the "Contractor"; and

_____,
_____,
_____,
and

_____,_____
hereinafter called the "Dispute Review Board" or "Board".

WHEREAS, the Department is now engaged in the construction of the _____

**[Project Name]**_____

and

WHEREAS, the Contract provides for the establishment of a Board in accordance with subsections 105.22 and 105.23 of the specifications.

NOW, THEREFORE, it is hereby agreed:

ARTICLE I
DESCRIPTION OF WORK AND SERVICES

The Department and the Contractor shall form a Board in accordance with this agreement and the provisions of subsection 105.23.

ARTICLE II
COMMITMENT ON PART OF THE PARTIES HERETO

The parties hereto shall faithfully fulfill the requirements of subsection 105.23 and the requirements of this agreement.

ARTICLE III
COMPENSATION

The parties shall share equally in the cost of the Board, including general administrative costs (meeting space and facilities, secretarial services, telephone, mail, reproduction, filing) and the member's individual fees. Reimbursement of the Contractor's share of the Board expenses for any reason is prohibited.

The Contractor shall make all payments in full to Board members. The Contractor will submit to the Department an itemized statement for all such payments, and the Department will split the cost by including 50 percent payment on the next progress payment. The Contractor and the Department will agree to accept invoiced costs prior to payment by the Contractor.



Board members shall keep all fee records pertaining to this agreement available for inspection by representatives of the Department and the Contractor for a period of three years after the termination of the Board members' services.

Payment to each Board member shall be at the fee rates established in subsection 105.23 and agreed to by each Board member, the Contractor, and the Department. In addition, reimbursement will be made for applicable expenses.

Each Board member shall submit an invoice to the Contractor for fees incurred each month following a month in which the members participated in Board functions. Such invoices shall be in the format established by the Contractor and the Department.

Payments shall be made to each Board member within 60 days after the Contractor and Department have received all the applicable billing data and verified the data submitted by that member. The Contractor shall make payment to the Board member within seven calendar days of receipt of payment from the Department.

ARTICLE IV
ASSIGNMENT

Board members shall not assign any of the work to be performed by them under this agreement. Board members shall disclose any conflicts of interest including but not limited to any dealings with

the either party in the previous five years other than serving as a Board member under other contracts.

*ARTICLE V*

COMMENCEMENT AND TERMINATION OF SERVICES

The commencement of the services of the Board shall be in accordance with subsection 105.23 of the specifications and shall continue until all assigned disputes under the Contract which may require the Board's services have been heard and a Recommendation has been issued by the Board as specified in subsection 105.23. If a Board member is unable to fulfill his responsibilities for reasons specified in subsection 105.23(b)7, he shall be replaced as provided therein, and the Board shall fulfill its responsibilities as though there had been no change.

ARTICLE VI
LEGAL RELATIONS

The parties hereto mutually agree that each Board member in performance of his duties on the Board is acting as an independent contractor and not as an employee of either the Department or the Contractor. Board members will guard their independence and avoid any communication about the substance of the dispute without both parties being present.

The Board members are absolved of any personal liability arising from the Recommendations of the Board. The parties agree that members of the dispute review board panel are acting as mediators for purposes of C.R.S. § 13-22-302(4) and, as such, the liability of any dispute review board member shall be limited to willful and wanton misconduct as provided for in C.R.S. § 13-22-305(6)

DISPUTE REVIEW BOARD

THREE PARTY AGREEMENT PAGE 3
COLORADO PROJECT NO._____

IN WITNESS HEREOF, the parties hereto have caused this agreement to be executed the day and year first written above.

BOARD MEMBER: _____.

BY:_____.

BOARD MEMBER: _____.

BY: _____.

BOARD MEMBER: _____.

BY: _____.

CONTRACTOR: _____.

BY: _____.
TITLE:

COLORADO DEPARTMENT OF TRANSPORTATION

BY: _____ Date: _____.

TITLE: CHIEF ENGINEER

**105.24 Claims for Unresolved Disputes.** The Contractor may file a claim only if the disputes resolution process described in subsections 105.22 and 105.23 has been exhausted without resolution of the dispute. Other methods of nonbinding dispute resolution, exclusive of arbitration and litigation, can be used if agreed to by both parties.

This subsection applies to any unresolved dispute or set of disputes between CDOT and the Contractor with an aggregate value of more than $15,000. Unresolved disputes with an aggregate value of more than $15,000 from subcontractors, materials suppliers or any other entity not a party to the Contract shall be submitted through the Contractor in accordance with this subsection as a pass-through claim. Review of a pass-through claim does not create privity of Contract between CDOT and any other entity.

Subsections 105.22, 105.23 and 105.24 provide both contractual alternative dispute resolution processes and constitute remedy-granting provisions pursuant to Colorado Revised Statutes which must be exhausted in their entirety.

Merit-binding arbitration or litigation proceedings must commence within 180-calendar days of the Chief Engineer's decision, absent written agreement otherwise by both parties.

The venue for all unresolved disputes with an aggregate value $15,000 or less shall be the County Court for the City and County of Denver.

Non-binding Forms of alternative dispute resolution such as Mediation are available upon mutual agreement of the parties for all claims submitted in accordance with this subsection.

The cost of the non-binding ADR process shall be shared equally by both parties with each party bearing its own preparation costs. The type of nonbinding ADR process shall be agreed upon by the parties and shall be conducted within the State of Colorado at a mutually acceptable location. Participation in a nonbinding ADR process does not in any way waive the requirement that merit-binding arbitration or litigation proceedings must commence within 180-calendar days of the Chief Engineer's decision, absent written agreement otherwise by both parties.

(a) *Notice of Intent to File a Claim*.

Within 30 days after rejection of the Dispute Resolution Board's Recommendation issued in accordance with subsection 105.23, the Contractor shall provide the Region Transportation Director with a written notice of intent to file a claim. The Contractor shall also send a copy of this notice to the Resident Engineer. For the purpose of this subsection Region Transportation Director shall mean the Region Transportation Director or the Region Transportation Director's designated representative. CDOT will acknowledge in writing receipt of Notice of Intent within 7 days.

(b) *Claim Package Submission*. Within 60 days after submitting the notice of intent to file a claim, the Contractor shall submit five copies of a complete claim package representing the final position the Contractor wishes to have considered. All claims shall be in writing and in sufficient detail to enable the RTD to ascertain the basis and amount of claim. The claim package shall include all documents supporting the claim, regardless of whether such documents were provided previously to CDOT.

If requested by the Contractor the 60 day period may be extended by the RTD in writing prior to final acceptance. As a minimum, the following information shall accompany each claim.

1. A claim certification containing the following language, as appropriate:

A. For a direct claim by the Contractor:

CONTRACTOR'S CLAIM CERTIFICATION

Under penalty of law for perjury or falsification, the undersigned,_____(name)_____, (title)_____, of _____(company)_____, hereby certifies that the claim of

$_____for extra compensation and ____ Days additional time, made herein for work on this contract is true to the best of my knowledge and belief and supported under the Contract between the parties.

This claim package contains all available documents that support the claims made herein and I understand that no additional information, other than for clarification and data supporting previously submitted documentation, may be presented by me.

Dated _____/s/_____

_____

Subscribed and sworn before me this __ day of_____.

_____

NOTARY PUBLIC

My Commission Expires: _____

B. For a pass-through claim:

PASS-THROUGH CLAIM CERTIFICATION

Under penalty of law for perjury or falsification, the undersigned,_____(name)_____, (title)_____, of _____(company)_____, hereby certifies that the claim of

$_____ for extra compensation and ____ Days additional time, made herein for work on this Project is true to the best of my knowledge and belief and supported under the contract between the parties.

This claim package contains all available documents that support the claims made herein and I understand that no additional information, other than for clarification and data supporting previously submitted documentation, may be presented by me.

Dated _____/s/_____

_____

Subscribed and sworn before me this __day of _____ .

_____

NOTARY PUBLIC

My Commission Expires: _____

Dated _____/s_____

_____

The Contractor certifies that the claim being passed through to CDOT is passed through in good faith and is accurate and complete to the best of my knowledge and belief.

Dated _____/s/_____

_____

Subscribed and sworn before me this __ day of _____

_____.

_____

NOTARY PUBLIC

My Commission Expires: _____

2. A detailed factual statement of the claim for additional compensation, time, or both, providing all necessary dates, locations, and items of work affected by the claim. The Contractor's detailed factual statement shall expressly describe the basis of the claim and factual evidence supporting the claim. This requirement is not satisfied by simply incorporating into

the claim package other documents that describe the basis of the claim and supporting factual evidence.

3. The date on which facts were discovered which gave rise to the claim.
4. The name, title, and activity of all known CDOT, Consultant, and other individuals who may be knowledgeable about facts giving rise to such claim.
5. The name, title, and activity of all known Contractor, subcontractor, supplier and other individuals who may be knowledgeable about facts giving rise to such claim.
6. The specific provisions of the Contract, which support the claim and a statement of the reasons why such provisions support the claim.
7. If the claim relates to a decision of the Project Engineer, which the Contract leaves to the Project Engineer's discretion, the Contractor shall set out in detail all facts supporting its position relating to the decision of the Project Engineer.
8. The identification of any documents and the substance of all oral communications that support the claim.
9. Copies of all known documents that support the claim.
10. The Dispute Review Board Recommendation.
11. If an extension of contract time is sought, the documents required by subsection 108.08(d).
12. If additional compensation is sought, the exact amount sought and a breakdown of that amount into the following categories:

    A. These categories represent the only costs that are recoverable by the Contractor. All other costs or categories of costs are not recoverable:

    (1) Actual wages and benefits, including FICA, paid for additional labor
    (2) Costs for additional bond, insurance and tax
    (3) Increased costs for materials
    (4) Equipment costs calculated in accordance with subsection 109.04(c) for Contractor owned equipment and based on certified invoice costs for rented equipment
    (5) Costs of extended job site overhead
    (6) Salaried employees assigned to the project
    (7) Claims from subcontractors and suppliers at any level (the same level of detail as specified herein is required for all such claims)
    (8) An additional 16 percent will be added to the total of items (1) through (7) as compensation for items for which no specific allowance is provided, including profit and home office overhead.
    (9) Interest shall be paid in accordance with CRS 5-12-102 beginning from the date of the Notice of Intent to File Claim

    B. In adjustment for the costs as allowed above, the Department will have no liability for the following items of damages or expense:

    (1) Profit in excess of that provided in 12.A.(8) above
    (2) Loss of Profit
    (3) Additional cost of labor inefficiencies in excess of that provided in A. above
    (4) Home office overhead in excess of that provided in A. above
    (5) Consequential damages, including but not limited to loss of bonding capacity, loss of bidding opportunities, and insolvency
    (6) Indirect costs or expenses of any nature in excess of that provided in A. above
    (7) Attorney's fees, claim preparation fees, and expert fees

(c) *Audit.* An audit may be performed by the Department for any dispute or claim, and is mandatory for all disputes and claims with amounts greater than $250,000. All audits will be complete within

60 days of receipt of the complete claim package, provided the Contractor allows the auditors reasonable and timely access to the Contractor's books and records. For all claims with amounts greater than $250,000 the Contractor shall submit a copy of certified claim package directly to the CDOT Audit Unit at the following address:

Division of Audit
4201 E. Arkansas Ave
Denver, Co. 80222

(d) *Region Transportation Director Decision*. When the Contractor properly files a claim, the RTD will review the claim and render a written decision to the Contractor to either affirm or deny the claim, in whole or in part, in accordance with the following procedure.

The RTD may consolidate all related claims on a project and issue one decision, provided that consolidation does not extend the time period within which the RTD is to render a decision. Consolidation of unrelated claims will not be made.

The RTD will render a written decision to the Contractor within 60 days after the receipt of the claim package or receipt of the audit whichever is later. In rendering the decision, the RTD: (1) will review the information in the Contractor's claim; (2) will conduct a hearing if requested by either party; and (3) may consider any other information available in rendering a decision.

The RTD will assemble and maintain a claim record comprised of all information physically submitted by the Contractor in support of the claim and all other discoverable information considered by the RTD in reaching a decision. Once the RTD assembles the claim record, the submission and consideration of additional information, other than for clarification and data supporting previously submitted documentation, at any subsequent level of review by anyone, will not be permitted.

The RTD will provide a copy of the claim record and the written decision to the Contractor describing the information considered by the RTD in reaching a decision and the basis for that decision. If the RTD fails to render a written decision within the 60 day period, or within any extended time period as agreed to by both parties, the Contractor shall either: (1) accept this as a denial of the claim, or (2) appeal the claim to the Chief Engineer, as described in this subsection.

If the Contractor accepts the RTD decision, the provisions of the decision shall be implemented in accordance with subsections 108.08, 109.04, 109.05, or 109.10 and the claim is resolved.

If the Contractor disagrees with the RTD decision, the Contractor shall either: (1) accept the RTD decision as final, or (2) file a written appeal to the Chief Engineer within 30 days from the receipt of the RTD decision. The Contractor hereby agrees that if a written appeal is not properly filed, the RTD decision is final.

(e) *Chief Engineer Decision*. When a claim is appealed, the RTD will provide the claim record to the Chief Engineer. Within 15 days of the appeal either party may submit a written request for a hearing with the Chief Engineer or duly authorized Headquarters delegates. The Chief Engineer or a duly authorized Headquarters delegate will review the claim and render a decision to affirm, overrule, or modify the RTD decision in accordance with the following.

The Contractor's written appeal to the Chief Engineer will be made a part of the claim record.

The Chief Engineer will render a written decision within 60 days after receiving the written appeal. The Chief Engineer will not consider any information that was not previously made a part of the claim record, other than clarification and data supporting previously submitted documentation.

The Contractor shall have 30 days to accept or reject the Chief Engineer's decision. The Contractor shall notify the Chief Engineer of its acceptance or rejection in writing.

If the Contractor accepts the Chief Engineer's decision, the provisions of the decision will be implemented in accordance with subsections 108.08, 109.04, 109.05, or 109.10 and the claim is resolved.

If the Contractor disagrees with the Chief Engineer's decision, the Contractor shall either (1) pursue an alternative dispute resolution process in accordance with this specification or (2) initiate litigation or merit binding arbitration in accordance with subsection 105.24(f).

If the Chief Engineer does not issue a decision as required, the Contractor may immediately initiate either litigation or merit binding arbitration in accordance with subsection 105.24(f).

For the convenience of the parties to the Contract it is mutually agreed by the parties that any merit binding arbitration or De Novo litigation shall be brought within 180-calendar days from the date of the Chief Engineer's decision. The parties understand and agree that the Contractor's failure to bring suit within the time period provided, shall be a complete bar to any such claims or causes of action.

(f) *De Novo Litigation or Merit Binding Arbitration*. If the Contractor disagrees with the Chief Engineer's decision, the Contractor may initiate de novo litigation or merit binding arbitration to finally resolve the claim that the Contractor submitted to CDOT, depending on which option was selected by the Contractor on Form 1378 which shall be submitted at the preconstruction conference. Such litigation or arbitration shall be strictly limited to those claims that were previously submitted and decided in the contractual dispute and claims processes outlined herein. This does not preclude the joining in one litigation or arbitration of multiple claims from the same project provided that each claim has gone through the dispute and claim process specified in subsections 105.22 through 105.24. The parties may agree, in writing, at any time, to pursue some other form of alternative dispute resolution.

Any offer made by the Contractor or the Department at any stage of the claims process, as set forth in this subsection, shall be deemed an offer of settlement pursuant to Colorado Rule of Evidence 408 and therefore inadmissible in any litigation or arbitration.

If the Contractor selected litigation, then de novo litigation shall proceed in accordance with the Colorado Rules of Civil Procedure and the proper venue is the Colorado State District Court in and for the City and County of Denver, unless both parties agree to the use of arbitration.

If the Contractor selected merit binding arbitration, or if both parties subsequently agreed to merit binding arbitration, arbitration shall be governed by the modified version of AAA's Construction Industry Arbitration Rules which follow. Pursuant to the modified arbitration rules (R35 through R39), the arbitrators shall issue a binding decision with regard to entitlement and a non-binding decision with regard to quantum. If either party disagrees with the decision on quantum, the disagreeing party may seek a trial de novo in Denver District Court with regard to quantum only.

**AMERICAN ARBITRATION ASSOCIATION CONSTRUCTION INDUSTRY ARBITRATION RULES MODIFIED FOR USE WITH CDOT SPECIFICATION SUBSECTION 105.24**

**REGULAR TRACK PROCEDURES**

**R-1. Agreement of Parties**

(a) The parties shall be deemed to have made these rules a part of their Contract. These rules and any amendments shall apply in the form in effect at the time the administrative requirements are met for a demand

for arbitration. The parties, by written agreement, may vary the procedures set forth in these rules. After appointment of the arbitrator, such modifications may be made only with the consent of the arbitrator.

(b) Unless the parties determine otherwise, the Fast Track Procedures shall apply in any case in which aggregate claims do not exceed $75,000, exclusive of interest and arbitration fees and costs. Parties may also agree to use these procedures in larger cases. Unless the parties agree otherwise, these procedures will not apply in cases involving more than two parties except for pass-through claims. The Fast Track Procedures shall be applied as described in Sections F-1 through F-13 of these rules, in addition to any other portion of these rules that is not in conflict with the Fast Track Procedures.

(c) Unless the parties agree otherwise, the Procedures for Large, Complex Construction Disputes shall apply to all cases in which the disclosed aggregate claims of any party is at least $500,000, exclusive of claimed interest, arbitration fees and costs. Parties may also agree to use these procedures in cases involving claims under $500,000, or in nonmonetary cases. The Procedures for Large, Complex Construction Disputes shall be applied as described in Sections L-1 through L-4 of these rules, in addition to any other portion of these rules that is not in conflict with the Procedures for Large, Complex Construction Disputes.

(d) All other cases shall be administered in accordance with Sections R-1 through R-45 of these rules.

**R-2. Independent Arbitration Provider and Delegation of Duties**

When parties agree to arbitrate under these rules, or when they provide for arbitration by an independent third-party (Arbitration Provider) and arbitration is initiated under these rules, they thereby authorize the Arbitration Provider to administer the arbitration. The authority and duties of the Arbitration Provider are prescribed in the parties' Contract and in these rules, and may be carried out through such of the Arbitration Provider's representatives as it may direct. The Arbitration Provider will assign the administration of an arbitration to its Denver office

**R-3. Initiation of Arbitration**

Arbitration shall be initiated in the following manner.

(a) The Contractor shall, within 30 days after the Chief Engineer issues a decision, submit to the Chief Engineer written notice of its intention to arbitrate (the "demand"). The demand shall indicate the appropriate qualifications for the arbitrator(s) to be appointed to hear the arbitration.

(b) CDOT may file an answering statement with the Contractor within 15 days after receiving the demand. If a counterclaim is asserted, it shall contain a statement setting forth the nature of the counterclaim, the amount involved, if any, and the remedy sought.

(c) The Chief Engineer shall retain an Arbitration Provider, such as the American Arbitration Association, which will administer an arbitration pursuant to these Rules, except to the extent that such rules conflict with the specifications, in which case the specifications shall control.

(d) The Arbitration Provider shall confirm its retention to the parties.

**R-4. Consolidation or Joinder**

If the parties' agreement or the law provides for consolidation or joinder of related arbitrations, all involved parties will endeavor to agree on a process to effectuate the consolidation or joinder.

If they are unable to agree, the Arbitration Provider shall directly appoint a single arbitrator for the limited purpose of deciding whether related arbitrations should be consolidated or joined and, if so, establishing a fair and appropriate process for consolidation or joinder. The Arbitration Provider may take reasonable administrative action to accomplish the consolidation or joinder as directed by the arbitrator.

**R-5. Appointment of Arbitrator**

An arbitrator shall be appointed in the following manner:

(a) Immediately after the Arbitration Provider is retained, the Arbitration Provider shall send simultaneously to each party to the dispute an identical list of 10 names of potential arbitrators. The parties are encouraged to agree to an arbitrator from the submitted list and to advise the AAA of their agreement. Absent agreement of the parties, the arbitrator shall not have served as the mediator in the mediation phase of the instant proceeding.

(b) If the parties cannot agree to arbitrator(s), each party to the dispute shall have 15 calendar days from the transmittal date in which to strike names objected to, number the remaining names in order of preference, and return the list to the Arbitration Provider. If a party does not return the list within the time specified, all persons named therein shall be deemed acceptable. From among the persons who have been approved on both lists, and in accordance with the designated order of mutual preference, the Arbitration Provider shall invite an arbitrator to serve.

(c) Unless both parties agree otherwise one arbitrator shall be used for claims less than $250,000 and three arbitrators shall be used for claims $250,000 and greater. Within 15 calendar days from the date of the appointment of the last arbitrator, the Arbitration Provider shall appoint a chairperson.

(d) The entire claim record will be made available to the arbitrators by the Chief Engineer within 15 calendar days from the date of the appointment of the last arbitrator.

**R-6. Changes of Claim**

The arbitrator(s) will not consider any information that was not previously made a part of the claim record as transmitted by the Chief Engineer, other than clarification and data supporting previously submitted documentation.

**R-7. Disclosure**

(a) Any person appointed or to be appointed as an arbitrator shall disclose to the Arbitration Provider any circumstance likely to give rise to justifiable doubt as to the arbitrator's impartiality or independence, including any bias or any interest in the result of the arbitration or any relationship with the parties or their representatives. Such obligation shall remain in effect throughout the arbitration.

(b) Upon receipt of such information from the arbitrator or another source, the Arbitration Provider shall communicate the information to the parties and, if it deems it appropriate to do so, to the arbitrator and others.

(c) In order to encourage disclosure by arbitrators, disclosure of information pursuant to this Section R-6 is not to be construed as an indication that the arbitrator considers that the disclosed circumstances are likely to affect impartiality or independence.

(d) In no case shall an arbitrator be employed by, affiliated with, or have consultive or business connection with the claimant Contractor or CDOT. An arbitrator shall not have assisted either in the evaluation, preparation, or presentation of the claim case either for the Contractor or the

Department or have rendered an opinion on the merits of the claim for either party, and shall not do so during the proceedings of arbitration.

**R-8. Disqualification of Arbitrator**

(a) Any arbitrator shall be impartial and independent and shall perform his or her duties with diligence and in good faith, and shall be subject to disqualification for: (i) partiality or lack of independence, (ii) inability or refusal to perform his or her duties with diligence and in good faith; and/or (iii) any grounds for disqualification provided by applicable law.

(b) Upon objection of a party to the continued service of an arbitrator, or on its own initiative, the Arbitration Provider shall determine whether the arbitrator should be disqualified under the grounds set out above, and shall inform the parties of its decision, which decision shall be conclusive.

**R-9. Communication with Arbitrator**

No party and no one acting on behalf of any party shall communicate *ex parte* with an arbitrator or a candidate for arbitrator concerning the arbitration.

**R-10. Vacancies**

(a) If for any reason an arbitrator is unable to perform the duties of the office, the Arbitration Provider may, on proof satisfactory to it, declare the office vacant. Vacancies shall be filled in accordance with the applicable provisions of these rules.

(b) In the event of a vacancy in a panel of neutral arbitrators after the hearings have commenced, the remaining arbitrator or arbitrators may continue with the hearing and determination of the controversy, unless the parties agree otherwise.

(c) In the event of the appointment of a substitute arbitrator, the panel of arbitrators shall determine in its sole discretion whether it is necessary to repeat all or part of any prior hearings.

**R-11. Jurisdiction**

(a) The arbitrator shall have the power to rule on his or her own jurisdiction, including any objections with respect to the existence, scope or validity of the arbitration agreement.

(b) The arbitrator shall have the power to determine the existence or validity of a contract of which an arbitration clause forms a part. Such an arbitration clause shall be treated as an agreement independent of the other terms of the contract. A decision by the arbitrator that the contract is null and void shall not for that reason alone render invalid the arbitration clause.

(c) A party must object to the jurisdiction of the arbitrator or to the arbitrability of a claim or counterclaim no later than 15 days after the Arbitration Provider confirms its retention to the parties. The arbitrator may rule on such objections as a preliminary matter or as part of the final award.

**R-12. Administrative Conference**

At the request of any party or upon the Arbitration Provider's own initiative, the Arbitration Provider may conduct an administrative conference, in person or by telephone, with the parties and/or their representatives. The conference may address such issues as arbitrator selection, potential exchange of information, a timetable for hearings and any other administrative matters.

**R-13. Preliminary Hearing**

(a) At the request of any party or at the discretion of the arbitrator or the Arbitration Provider, the arbitrator may schedule as soon as practicable a preliminary hearing with the parties and/or their

representatives. The preliminary hearing may be conducted by telephone at the arbitrator's discretion.

(b) During the preliminary hearing, the parties and the arbitrator should discuss the future conduct of the case, including clarification of the issues and claims, a schedule for the hearings and any other preliminary matters.

**R-14. Exchange of Information**

(a) At the request of any party or at the discretion of the arbitrator, consistent with the expedited nature of arbitration, the arbitrator may direct: (i) the production of documents and other information; (ii) short depositions, particularly with regard to experts; and/or (iii) the identification of any witnesses to be called.

(b) At least five business days prior to the hearing, the parties shall exchange copies of all exhibits they intend to submit at the hearing.

(c) The arbitrator is authorized to resolve any disputes concerning the exchange of information.

(d) Additional discovery may be ordered by the arbitrator in extraordinary cases when the demands of justice require it.

**R-15. Date, Time, and Place of Hearing**

(a) The arbitrator shall set the date, time, and place for each hearing and/or conference. The parties shall respond to requests for hearing dates in a timely manner, be cooperative in scheduling the earliest practicable date, and adhere to the established hearing schedule.

(b) The parties may mutually agree on the locale where the arbitration is to be held. Absent such agreement, the arbitration shall be held in the City and County of Denver.

(c) The Arbitration Provider shall send a notice of hearing to the parties at least ten calendar days in advance of the hearing date, unless otherwise agreed by the parties.

**R-16. Attendance at Hearings**

The arbitrator and the Arbitration Provider shall maintain the privacy of the hearings unless the law provides to the contrary. Any person having a direct interest in the arbitration is entitled to attend hearings. The arbitrator shall otherwise have the power to require the exclusion of any witness, other than a party or other essential person, during the testimony of any other witness. It shall be discretionary with the arbitrator to determine the propriety of the attendance of any person other than a party and its representative.

**R-17. Representation**

Any party may be represented by counsel or other authorized representative. A party intending to be so represented shall notify the other party and the Arbitration Provider of the name and address of the representative at least three calendar days prior to the date set for the hearing at which that person is first to appear.

**R-18. Oaths**

Before proceeding with the first hearing, each arbitrator may take an oath of office and, if required by law, shall do so. The arbitrator may require witnesses to testify under oath administered by any duly qualified person and, if it is required by law or requested by any party, shall do so.

**R-19. Stenographic Record**

Any party desiring a stenographic record shall make arrangements directly with a stenographer and shall notify the other parties of these arrangements at least three days in advance of the hearing. The

requesting party or parties shall pay the cost of the record. If the transcript is agreed by the parties, or determined by the arbitrator to be the official record of the proceeding, it must be provided to the arbitrator and made available to the other parties for inspection, at a date, time, and place determined by the arbitrator.

**R-20. Interpreters**

Any party wishing an interpreter shall make all arrangements directly with the interpreter and shall assume the costs of the service.

**R-21. Postponements**

The arbitrator for good cause shown may postpone any hearing upon agreement of the parties, upon request of a party, or upon the arbitrator's own initiative.

**R-22. Arbitration in the Absence of a Party or Representative**

Unless the law provides to the contrary, the arbitration may proceed in the absence of any party or representative who, after due notice, fails to be present or fails to obtain a postponement. An award shall not be made solely on the default of a party. The arbitrator shall require the party who is present to submit such evidence as the arbitrator may require for the making of an award.

**R-23. Conduct of Proceedings**

(a) The Contractor shall present evidence to support its claim. CDOT shall then present evidence supporting its defense. Witnesses for each party shall also submit to questions from the arbitrator and the adverse party. The arbitrator has the discretion to vary this procedure; provided that the parties are treated with equality and that each party has the right to be heard and is given a fair opportunity to present its case.

(b) The arbitrator, exercising his or her discretion, shall conduct the proceedings with a view to expediting the resolution of the dispute and may direct the order of proof, bifurcate proceedings, and direct the parties to focus their presentations on issues the decision of which could dispose of all or part of the case. The arbitrator shall entertain motions, including motions that dispose of all or part of a claim or that may expedite the proceedings, and may also make preliminary rulings and enter interlocutory orders.

(c) The parties may agree to waive oral hearings in any case.

**R-24. Evidence**

(a) The arbitrators shall consider all written information available in the claim record and all oral presentations in support of that record by the Contractor and CDOT. Conformity to legal rules of evidence shall not be necessary.

(b) The arbitrators shall not consider any written documents or arguments which have not previously been made a part of the claim record, other than clarification and data supporting previously submitted documentation. The arbitrators shall not consider an increase in the amount of the claim, or any new claims.

(c) The arbitrator shall determine the admissibility, relevance, and materiality of any evidence offered. The arbitrator may request offers of proof and may reject evidence deemed by the arbitrator to be cumulative, unreliable, unnecessary, or of slight value compared to the time and expense involved. All evidence shall be taken in the presence of all of the arbitrators and all of the parties, except where: (i) any of the parties is absent, in default, or has waived the right to be present, or (ii) the parties and the arbitrators agree otherwise.

(d) The arbitrator shall take into account applicable principles of legal privilege, such as those involving the confidentiality of communications between a lawyer and client.

(e) An arbitrator or other person authorized by law to subpoena witnesses or documents may do so upon the request of any party or independently.

**R-25. Evidence by Affidavit and Post-hearing Filing of Documents or Other Evidence**

(a) The arbitrator may receive and consider the evidence of witnesses by declaration or affidavit, but shall give it only such weight as the arbitrator deems it entitled to after consideration of any objection made to its admission.

(b) If the parties agree or the arbitrator directs that documents or other evidence be submitted to the arbitrator after the hearing, the documents or other evidence, unless otherwise agreed by the parties and the arbitrator, shall be filed with the Arbitration Provider for transmission to the arbitrator. All parties shall be afforded an opportunity to examine and respond to such documents or other evidence.

**R-26. Inspection or Investigation**

An arbitrator finding it necessary to make an inspection or investigation in connection with the arbitration shall direct the Arbitration Provider to so advise the parties. The arbitrator shall set the date and time and the Arbitration Provider shall notify the parties. Any party who so desires may be present at such an inspection or investigation. In the event that one or all parties are not present at the inspection or investigation, the arbitrator shall make an oral or written report to the parties and afford them an opportunity to comment.

**R-27. Interim Measures**

(a) The arbitrator may take whatever interim measures he or she deems necessary, including injunctive relief and measures for the protection or conservation of property and disposition of perishable goods.

(b) A request for interim measures addressed by a party to a judicial authority shall not be deemed incompatible with the agreement to arbitrate or a waiver of the right to arbitrate.

**R-28. Closing of Hearing**

When satisfied that the presentation of the parties is complete, the arbitrator shall declare the hearing closed.

If documents or responses are to be filed as provided in Section R-24, or if briefs are to be filed, the hearing shall be declared closed as of the final date set by the arbitrator for the receipt of documents, responses, or briefs. The time limit within which the arbitrator is required to make the award shall commence to run, in the absence of other agreements by the parties and the arbitrator, upon the closing of the hearing.

**R-29. Reopening of Hearing**

The hearing may be reopened on the arbitrator's initiative, or by direction of the arbitrator upon application of a party, at any time before the award is made. If reopening the hearing would prevent the making of the award within the specific time agreed to by the parties in the arbitration agreement, the matter may not be reopened unless the parties agree to an extension of time. When no specific date is fixed by agreement of the parties, the arbitrator shall have 15 calendar days from the closing of the reopened hearing within which to make an award.

**R-30. Waiver of Rules**

Any party who proceeds with the arbitration after knowledge that any provision or requirement of these rules has not been complied with and who fails to state an objection in writing shall be deemed to have waived the right to object.

**R-31. Extensions of Time**

The parties may modify any period of time by mutual agreement. The Arbitration Provider or the arbitrator may for good cause extend any period of time established by these rules, except the time for making the award. The Arbitration Provider shall notify the parties of any extension.

**R-32. Serving of Notice**

(a) Any papers, notices, or process necessary or proper for the initiation or continuation of an arbitration under these rules; for any court action in connection therewith, or for the entry of judgment on any award made under these rules, may be served on a party by mail addressed to the party or its representative at the last known address or by personal service, in or outside the state where the arbitration is to be held, provided that reasonable opportunity to be heard with regard thereto has been granted to the party.

(b) The Arbitration Provider, the arbitrator and the parties may also use overnight delivery, electronic facsimile transmission (fax), or electronic mail (email) to give the notices required by these rules.

(c) Unless otherwise instructed by the Arbitration Provider or by the arbitrator, any documents submitted by any party to the Arbitration Provider or to the arbitrator shall simultaneously be provided to the other party or parties to the arbitration.

**R-33. Majority Decision**

When the panel consists of more than one arbitrator, unless required by law or by the arbitration agreement, a majority of the arbitrators must make all decisions.

**R-34. Time of Award**

The award shall be made promptly by the arbitrator and, unless otherwise agreed by the parties or specified by law, no later than 30 calendar days from the date of closing the hearing, or, if oral hearings have been waived, from the date of the Arbitration Provider's transmittal of the final statements and proofs to the arbitrator.

**R-35. Form of Award**

After complete review of the facts associated with the claim, the arbitrators shall render a written explanation of their decision. When three arbitrators are used, and only two arbitrators agree then the award shall be signed by the two arbitrators. The arbitrator's decision shall include:

(a) A summary of the issues and factual evidence presented by the Contractor and the Department concerning the claim;

(b) Decisions concerning the validity of the claim;

(c) Decisions concerning the value of the claim as to cost impacts if the claim is determined to be valid;

(d) The contractual and factual bases supporting the decisions made including an explanation as to why each and every position was accepted or rejected;

(e) Detailed and supportable calculations which support any decisions.

**R-36. Scope of Award**

(a) The arbitrator may grant any remedy or relief that the arbitrator deems just and equitable and within the scope of the agreement of the parties, including, but not limited to, equitable relief and specific performance of a contract.

(b) In addition to the final award, the arbitrator may make other decisions, including interim, interlocutory, or partial rulings, orders, and awards. (c) The award of the arbitrator may include interest at the statutory rate and from such date as the arbitrator may deem appropriate.

**R-37. Delivery of Award to Parties**

Parties shall accept as notice and delivery of the award the placing of the award or a true copy thereof in the mail addressed to the parties or their representatives at the last known address, personal or electronic service of the award, or the filing of the award in any other manner that is permitted by law.

**R-38. Modification of Award**

Within 10 calendar days after the transmittal of an award, the arbitrator on his or her initiative, or any party, upon notice to the other parties, may request that the arbitrator correct any clerical, typographical, technical or computational errors in the award. The arbitrator is not empowered to redetermine the merits of any claim already decided.

If the modification request is made by a party, the other parties shall be given 10 calendar days to respond to the request. The arbitrator shall dispose of the request within 25 calendar days after transmittal by the Arbitration Provider to the arbitrator of the request.

If applicable law provides a different procedural time frame, that procedure shall be followed.

**R-39. Appeal of Award**

Appeal of the arbitrators' decision concerning the merit of the claim is governed by the Colorado Uniform Arbitration Act, C.R.S. §§ 13-22-202 to -230. Either party may appeal the arbitrator's decision on the value of the claim to the Colorado State District Court in and for the City and County of Denver for trial de novo.

**R-40. Release of Documents for Judicial Proceedings**

The Arbitration Provider shall, upon the written request of a party, furnish to the party, at its expense, certified copies of any papers in the Arbitration Provider's possession that may be required in judicial proceedings relating to the arbitration.

**R-41. Applications to Court and Exclusion of Liability**

(a) No judicial proceeding by a party relating to the subject matter of the arbitration shall be deemed a waiver of the party's right to arbitrate.

(b) Neither the Arbitration Provider nor any arbitrator in a proceeding under these rules is a necessary or proper party in judicial proceedings relating to the arbitration.

(c) Parties to these rules shall be deemed to have consented that judgment upon the arbitration award may be entered in any federal or state court having jurisdiction thereof.

(d) Parties to an arbitration under these rules shall be deemed to have consented that neither the Arbitration Provider nor any arbitrator shall be liable to any party in any action for damages or injunctive relief for any act or omission in connection with any arbitration under these rules.

**R-42. Administrative Fees**

The Arbitration Provider shall prescribe filing and other administrative fees and service charges to compensate it for the cost of providing administrative services. The fees in effect when the fee or charge is incurred shall be applicable. Such fees and charges shall be borne equally by the parties.

The Arbitration Provider may, in the event of extreme hardship on the part of any party, defer or reduce the administrative fees.

**R-43. Expenses**

The expenses of witnesses for either side shall be paid by the party producing such witnesses. All other expenses of the arbitration, including required travel and other expenses of the arbitrator, Arbitration Provider representatives, and any witness and the cost of any proof produced at the direct request of the arbitrator, shall be borne equally by the parties.

**R-44. Neutral Arbitrator's Compensation**

Arbitrators shall be compensated a rate consistent with the arbitrator's stated rate of compensation.

If there is disagreement concerning the terms of compensation, an appropriate rate shall be established with the arbitrator by the Arbitration Provider and confirmed to the parties.

Such compensation shall be borne equally by the parties.

**R-45. Deposits**

The Arbitration Provider may require the parties to deposit in advance of any hearings such sums of money as it deems necessary to cover the expense of the arbitration, including the arbitrator's fee, if any, and shall render an accounting to the parties and return any unexpended balance at the conclusion of the case.

**R-46. Interpretation and Application of Rules**

The arbitrator shall interpret and apply these rules insofar as they relate to the arbitrator's powers and duties by a majority vote. If that is not possible, either an arbitrator or a party may refer the question to the Arbitration Provider for final decision. All other rules shall be interpreted and applied by the Arbitration Provider.

**R-45. Suspension for Nonpayment**

If arbitrator compensation or administrative charges have not been paid in full, the Arbitration Provider may so inform the parties in order that the parties may advance the required payment. If such payments are not made, the arbitrator may order the suspension or termination of the proceedings. If no arbitrator has yet been appointed, the Arbitration Provider may suspend the proceedings.

**FAST TRACK PROCEDURES**

**F-1. Limitations on Extensions**

In the absence of extraordinary circumstances, the Arbitration Provider or the arbitrator may grant a party no more than one seven-day extension of the time in which to respond to the demand for arbitration or counterclaim as provided in Section R-3.

**F-2. Changes of Claim**

The arbitrator will not consider any information that was not previously made a part of the claim record as transmitted by the Chief Engineer, other than clarification and data supporting previously submitted documentation

**F-3. Serving of Notice**

In addition to notice provided above, the parties shall also accept notice by telephone. Telephonic notices by the Arbitration Provider shall subsequently be confirmed in writing to the parties. Should there be a failure to confirm in writing any such oral notice, the proceeding shall nevertheless be valid if notice has, in fact, been given by telephone.

**F-4. Appointment and Qualification of Arbitrator**

Immediately after the retention of the Arbitration Provider, the Arbitration Provider will simultaneously submit to each party a listing and biographical information from its panel of arbitrators knowledgeable

in construction who are available for service in Fast Track cases. The parties are encouraged to agree to an arbitrator from this list, and to advise the Arbitration Provider of their agreement, or any factual objections to any of the listed arbitrators, within 7 calendar days of the transmission of the list. The Arbitration Provider will appoint the agreed-upon arbitrator, or in the event the parties cannot agree on an arbitrator, will designate the arbitrator from among those names not stricken for factual objections.

The parties will be given notice by the Arbitration Provider of the appointment of the arbitrator, who shall be subject to disqualification for the reasons specified above. Within the time period established by the Arbitration Provider, the parties shall notify the Arbitration Provider of any objection to the arbitrator appointed. Any objection by a party to the arbitrator shall be for cause and shall be confirmed in writing to the Arbitration Provider with a copy to the other party or parties.

**F-5. Preliminary Telephone Conference**

Unless otherwise agreed by the parties and the arbitrator, as promptly as practicable after the appointment of the arbitrator, a preliminary telephone conference shall be held among the parties or their attorneys or representatives, and the arbitrator.

**F-6. Exchange of Exhibits**

At least 2 business days prior to the hearing, the parties shall exchange copies of all exhibits they intend to submit at the hearing. The arbitrator is authorized to resolve any disputes concerning the exchange of exhibits.

**F-7. Discovery**

There shall be no discovery, except as provided in Section F-4 or as ordered by the arbitrator in extraordinary cases when the demands of justice require it.

**F-8. Date, Time, and Place of Hearing**

The arbitrator shall set the date and time, and place of the hearing, to be scheduled to take place within 30 calendar days of confirmation of the arbitrator's appointment. The Arbitration Provider will notify the parties in advance of the hearing date. All hearings shall be held within the City and County of Denver.

**F-9. The Hearing**

(a) Generally, the hearing shall not exceed 1 day. Each party shall have equal opportunity to submit its proofs and complete its case. The arbitrator shall determine the order of the hearing, and may require further submission of documents within two business days after the hearing. For good cause shown, the arbitrator may schedule 1 additional hearing day within 7 business days after the initial day of hearing.

(b) Generally, there will be no stenographic record. Any party desiring a stenographic record may arrange for one pursuant to the provisions above.

**F-10. Time of Award**

Unless otherwise agreed by the parties, the award shall be rendered not later than 14 calendar days from the date of the closing of the hearing or, if oral hearings have been waived, from the date of the Arbitration Provider’s transmittal of the final statements and proofs to the arbitrator.

**F-11. Time Standards**

The arbitration shall be completed by settlement or award within 60 calendar days of confirmation of the arbitrator's appointment, unless all parties and the arbitrator agree otherwise or the arbitrator extends this time in extraordinary cases when the demands of justice require it.

**F-12. Arbitrator's Compensation**

Arbitrators will receive compensation at a rate to be suggested by the Arbitration Provider regional office.

**PROCEDURES FOR LARGE, COMPLEX CONSTRUCTION DISPUTES**

**L-1. Large, Complex Construction Disputes**

The procedures for large, complex construction disputes shall apply to any claim with a value exceeding $500,000 or as agreed to by the parties.

**L-2. Administrative Conference**

Prior to the dissemination of a list of potential arbitrators, the Arbitration Provider shall, unless the parties agree otherwise, conduct an administrative conference with the parties and/or their attorneys or other representatives by conference call. The conference call will take place within 14 days after the retention of the Arbitration Provider. In the event the parties are unable to agree on a mutually acceptable time for the conference, the Arbitration Provider may contact the parties individually to discuss the issues contemplated herein. Such administrative conference shall be conducted for the following purposes and for such additional purposed as the parties or the Arbitration Provider may deem appropriate:

(a) To obtain additional information about the nature and magnitude of the dispute and the anticipated length of hearing and scheduling;

(b) To discuss the views of the parties about the technical and other qualifications of the arbitrators;

(c) To obtain conflicts statements from the parties; and

(d) To consider, with the parties, whether mediation or other non-adjudicative methods of dispute resolution might be appropriate.

**L-3. Arbitrators**

(a) Large, Complex Construction Cases shall be heard and determined by three arbitrators.

(b) The Arbitration Provider shall appoint arbitrator(s) in the manner provided in the Regular Construction Industry Arbitration Rules.

**L-4. Preliminary Hearing**

As promptly as practicable after the selection of the arbitrator(s), a preliminary hearing shall be held among the parties and/or their attorneys or other representatives and the arbitrator(s). Unless the parties agree otherwise, the preliminary hearing will be conducted by telephone conference call rather than in person.

At the preliminary hearing the matters to be considered shall include, without limitation:

(a) Service of a detailed statement of claims, damages and defenses, a statement of the issues asserted by each party and positions with respect thereto, and any legal authorities the parties may wish to bring to the attention of the arbitrator(s);

(b) Stipulations to uncontested facts;

(c) The extent to which discovery shall be conducted;

(d) Exchange and premarking of those documents which each party believes may be offered at the hearing;

(e) The identification and availability of witnesses, including experts, and such matters with respect to witnesses including their biographies and expected testimony as may be appropriate;

(f) Whether, and the extent to which, any sworn statements and/or depositions may be introduced;

(g) The extent to which hearings will proceed on consecutive days;

(h) Whether a stenographic or other official record of the proceedings shall be maintained;

(i) The possibility of utilizing mediation or other non-adjudicative methods of dispute resolution; and

(j) The procedure for the issuance of subpoenas.

By agreement of the parties and/or order of the arbitrator(s), the pre-hearing activities and the hearing procedures that will govern the arbitration will be memorialized in a Scheduling and Procedure Order.

**L-5. Management of Proceedings**

(a) Arbitrator(s) shall take such steps as they may deem necessary or desirable to avoid delay and to achieve a just, speedy and cost-effective resolution of Large, Complex Construction Cases.

(b) Parties shall cooperate in the exchange of documents, exhibits and information within such party's control if the arbitrator(s) consider such production to be consistent with the goal of achieving a just, speedy and cost effective resolution of a Large, Complex Construction Case.

(c) The parties may conduct such discovery as may be agreed to by all the parties provided, however, that the arbitrator(s) may place such limitations on the conduct of such discovery as the arbitrator(s) shall deem appropriate. If the parties cannot agree on production of document and other information, the arbitrator(s), consistent with the expedited nature of arbitration, may establish the extent of the discovery.

(d) At the discretion of the arbitrator(s), upon good cause shown and consistent with the expedited nature of arbitration, the arbitrator(s) may order depositions of, or the propounding of interrogatories to such persons who may possess information determined by the arbitrator(s) to be necessary to a determination of the matter.

(e) The parties shall exchange copies of all exhibits they intend to submit at the hearing 10 business days prior to the hearing unless the arbitrator(s) determine otherwise.

(f) The exchange of information pursuant to this rule, as agreed by the parties and/or directed by the arbitrator(s), shall be included within the Scheduling and Procedure Order.

(g) The arbitrator is authorized to resolve any disputes concerning the exchange of information.

(h) Generally hearings will be scheduled on consecutive days or in blocks of consecutive days in order to maximize efficiency and minimize costs.

The following flow chart provides a summary of the disputes and claims process described in subsections 105.22, 105.23, and 105.24

**Figure 105-1**
**DISPUTES AND CLAIMS FLOW CHART**

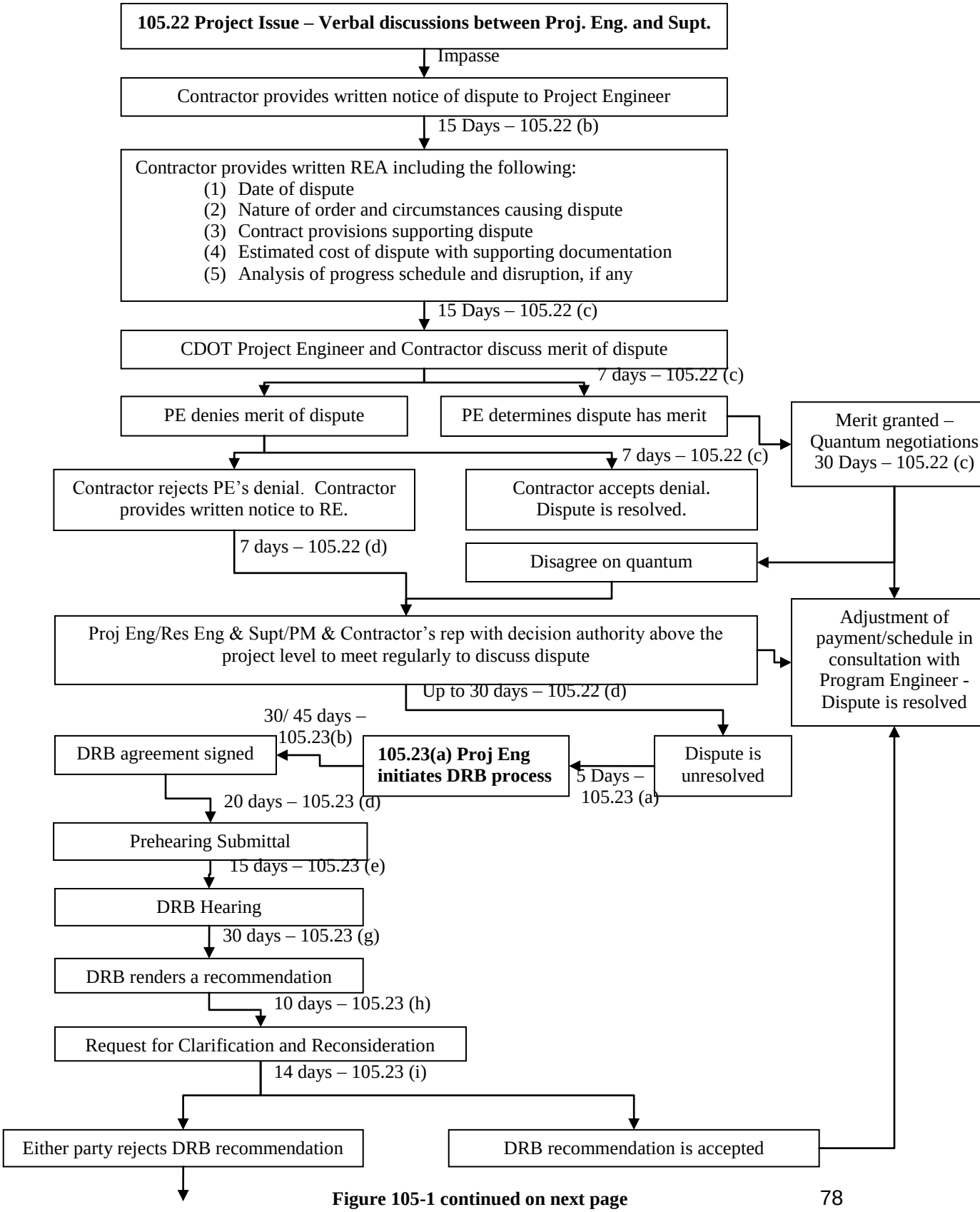
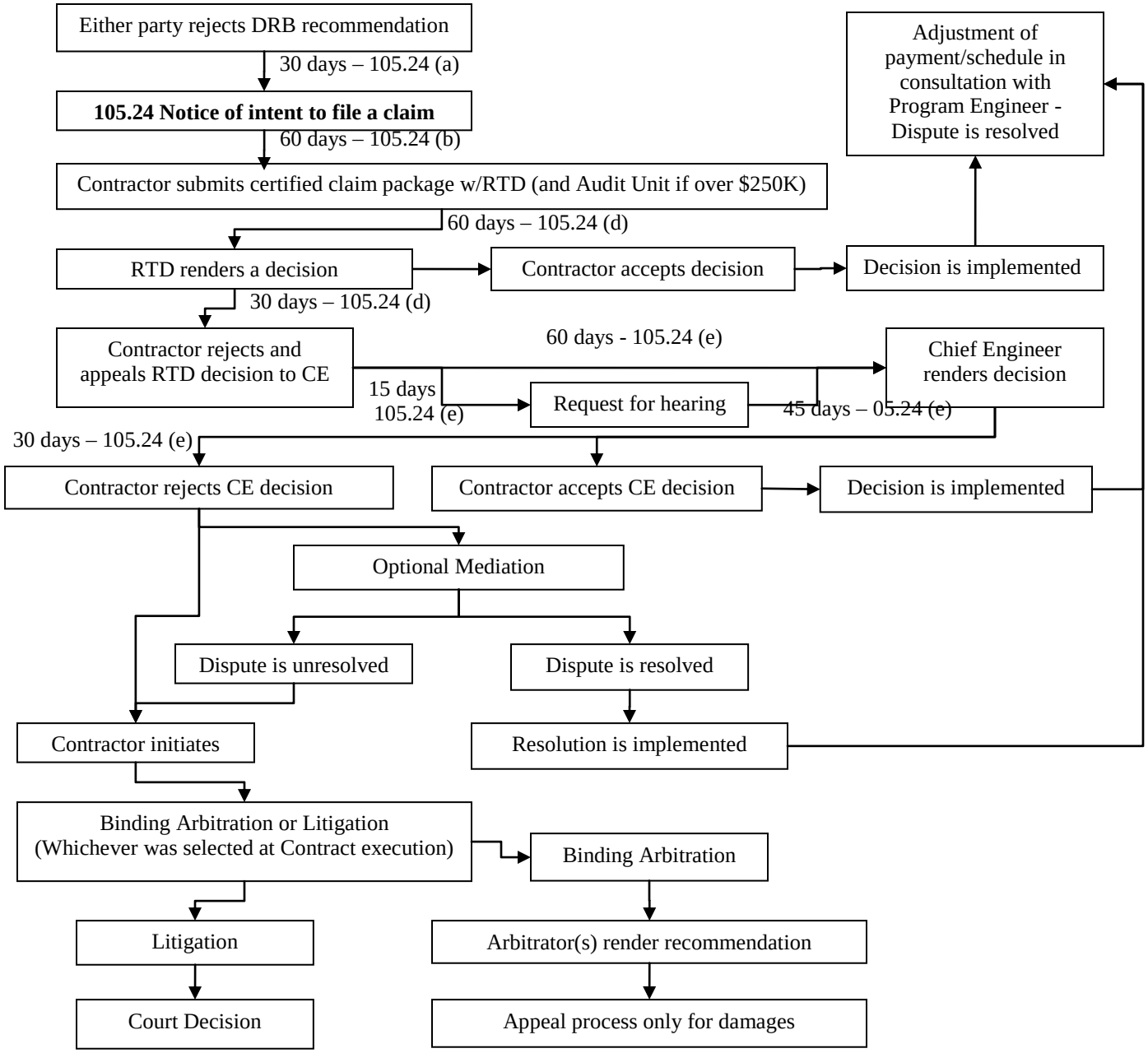



**Figure 105-1 continued on next page**

**Figure 105-1 (continued)**



**REVISION OF SECTION 105**
**VIOLATION OF WORKING TIME LIMITATION**

Section 105 of the Standard Specifications is hereby revised for this project as follows:

Subsection 105.03 shall include the following:

If there is a violation of the working time limitations for traffic control as set forth in the special provisions, a written notice to stop work will be imposed on the Contractor at the start of the next working day. Work shall not resume until the Contractor assures the Engineer, in writing, that there will not be a reoccurrence of the working time violation. If more violations take place, the Engineer will notify the Contractor in writing that there will be a price reduction charge for each incident in accordance with this specification. This incident price reduction charge will be deducted from any money due the Contractor. This price reduction will not be considered a penalty but will be a price reduction for failure to perform traffic control in compliance with the Contract.

An incident is any violation up to 30 minutes in duration. Each 30 minutes or increment thereof will be considered as an incident. A price reduction will be assessed for each successive or cumulative 30 minute period in violation of the working time limitations, as determined by the Engineer. The price reduction for each incident will increase at a progressive rate starting with $150 for the second incident and increasing to $1200 for the fifth and subsequent incidents in accordance with the following schedule. A 15 minute grace period will be allowed at the beginning of the second incident on the project before the price reduction is applied. This 15 minute grace period applies only to the second incident.

The number of incident charges will be accumulative throughout the duration of the Contract.

**PRICE REDUCTION SCHEDULE**

| ***Incident*** | ***Incident Rate*** | ***Total Price Reduction*** |
|---|---|---|
| 1st | Notice to Stop Work | ---- |
| 2nd | $150 | $150 |
| 3rd | 300 | 450 |
| 4th | 600 | 1,050 |
| 5th | 1,200 | 2,250 |
| 6th | 1,200 | 3,450 |
| Etc. | 1,200 | 4,650 |
| | Etc. | Etc. |

**REVISION OF SECTION 106**
**BUY AMERICA REQUIREMENTS**

Section 106 of the Standard Specifications is hereby revised for this project as follows:

Subsection 106.11 shall include the following:

The Contractor shall maintain a document summarizing the date and quantity of all steel and iron material delivered to the project. The document shall show the pay item, quantity of material delivered to the project, along with the quantity of material installed by the cutoff date for the monthly progress payment. The summary shall also reconcile the pay item quantities to the submitted Buy America certifications. The Contractor shall also maintain documentation of the project delivered cost of all foreign steel or iron permanently incorporated into the project. Both documents shall be submitted to the Engineer within five days of the cutoff date for the monthly progress payment. A monthly summary shall be required even if no steel or iron products are incorporated into the project during the month. The summary document does not relieve the Contractor of providing the necessary Buy America certifications of steel and or iron prior to permanent incorporation into the project.

**REVISION OF SECTION 106**
**CERTIFICATES OF COMPLIANCE AND CERTIFIED TEST REPORTS**

Section 106 of the Standard Specifications is hereby revised for this project as follows:

**In subsection 106.12, delete the second paragraph and replace it with the following:**

**The original Certificate of Compliance shall include the Contractor's original signature as directed above. The original signature (including corporate title) on the Certificate of Compliance, under penalty of perjury, shall be of a person having legal authority to act for the manufacturer. It shall state that the product or assembly to be incorporated into the project has been sampled and passed all specified tests in conformity to the plans and specifications for this project. One legible copy of the fully signed Certificate of Compliance shall be furnished to the Engineer prior to installation of material. The original shall be provided to the Engineer before payment for the represented item will be made.**

In subsection 106.13, delete the second paragraph and replace it with the following:

The Certified Test Report shall be a legible copy or an original document and shall include the Contractor's original signature as directed above. The signature (including corporate title) on the Certified Test Report, under penalty of perjury, shall be of a person having legal authority to act for the manufacturer or the independent testing laboratory. It shall state that the test results show that the product or assembly to be incorporated into the project has been sampled and passed all specified tests in conformity to the plans and specifications for this project. One legible copy or original document of the fully signed Certified Test Report shall be furnished to the Engineer prior to installation of material. Failure to comply may result in delays to the project or rejection of the materials.

**REVISION OF SECTION 106**
**MATERIAL SOURCES**

Section 106 of the Standard Specifications is hereby revised for this project as follows:

In subsection 106.02 (a), delete the third paragraph and replace with the following:

The Contract will indicate whether the Department has or has not obtained the necessary County or City Zoning Clearance and the required permit from Colorado Department of Natural Resources needed to explore and remove materials from the available source. If the Department did not obtain the necessary clearances or permits, the Contractor shall obtain them. Any delays to the project or additional expenses that are incurred while these clearances or permits are being obtained shall be the responsibility of the Contractor. The Contractor shall ensure that the requirements of the permits do not conflict with the pit construction and reclamation requirements shown in the Contract for the available source.

In subsection 106.02 (b), delete the first paragraph and replace with the following:

(b) *Contractor Source.* Sources of sand, gravel, or borrow other than available sources will be known as contractor sources. The contractor source will be tested by the Department and approved by the Engineer prior to incorporation of the material into the project. If the submitted materials do not meet the contract specifications it will become the Contractor's responsibility to re-sample and test the material. The Contractor will supply the Department with passing test results from an AASHTO accredited laboratory and signed and sealed by a Professional Engineer. If requested by the Engineer, the Department will then re-sample and re-test the material for compliance to the contract specifications. The Contractor shall produce material which meets contract specifications throughout construction of the project.

The cost of sampling, testing, and corrective action by the Contractor will not be paid for separately but shall be included in the work.

**REVISION OF SECTION 106**
**SUPPLIER LIST**

Section 106 of the Standard Specifications is hereby revised for this project as follows:

Subsection 106.01 shall include the following:

Prior to beginning any work the Contractor shall submit to the Engineer a completed Form 1425, Supplier List. During the performance of the Contract, the Contractor shall submit an updated Form 1425 when requested by the Engineer.

Failure to comply with the requirements of this subsection shall be grounds for withholding of progress payments.

**REVISION OF SECTIONS 106, 627, AND 713**
**GLASS BEADS FOR PAVEMENT MARKING**

Sections 106, 627, and 713 are hereby revised for this project as follows:

Subsection 106.11 shall include the following:

All post consumer and industrial glass beads for pavement marking shall have been manufactured from North American glass waste streams in the United States of America. The bead manufacturer shall submit a COC in accordance with subsection 106.12 confirming that North American glass waste streams were used in the manufacture of the glass beads.

Subsection 627.04 shall include the following:

Glass beads shall be applied into the paint by means of a low pressure, gravity drop bead applicator.

In subsection 627.05, delete the seventh paragraph and replace with the following:

Epoxy pavement marking shall be applied to the road surface according to the epoxy manufacturer's recommended methods at the application rate or coverage shown below. Glass beads shall be applied into the epoxy pavement marking by means of a low pressure, gravity drop bead applicator.

In subsection 627.05, delete the last paragraph and replace with the following:

Epoxy pavement marking and beads shall be applied within the following limits:

| | **Application Rate or Coverage Per Gallon of Epoxy Pavement Marking** | |
|---|---|---|
| | **Minimum** | **Maximum** |
| 16 – 18 mil marking | 90 sq. ft. | 100 sq. ft. |
| Beads | 20 lbs. | 22 lbs. |

Subsection 627.06 (c) shall include the following:

Glass beads shall be applied into the thermoplastic pavement marking by means of a low pressure, gravity drop bead applicator.

In subsection 713.08, delete the first and third paragraphs and replace with the following:

**713.08 Glass Beads for Pavement Marking.** Glass beads for pavement marking shall conform to AASHTO M 247, except for the following:

(1) Gradation:

| U.S. Mesh | Microns | % Passing | |
|---|---|---|---|
| | | Epoxy and MMA | Waterborne, Low VOC and High Build |
| 16 | 1180 | 90-100 | 100 |
| 18 | 1000 | 65-80 | 97-100 |
| 20 | 850 | | 85-100 |
| 30 | 600 | 30-50 | 50-70 |
| 40 | 425 | | 10-35 |
| 50 | 300 | 0-5 | 0-10 |
| 80 | 180 | | 0-5 |

(2) Roundness: All beads shall meet a minimum of 80 percent true spheres in accordance with the Office of Federal Lands Highways FLH T520 or a computerized optical testing method.

(3) Color / Clarity: Beads shall be colorless, clear, and free of carbon residues.

(4) Refractive Index: Minimum 1.51 by oil immersion method.

(5) Air Inclusions: Less than 5 percent by visual count.

(6) Coatings: Per manufacturer's recommendation for optimum adhesion and embedment.

(7) Chemical Resistance: Beads shall be resistant to hydrochloric acid, water, calcium chloride, and sodium sulfide as tested per methods outlined in sections 4.3.6 to 4.3.9 of the TT-B Federal Spec.1325D.

(8) For Epoxy Pavement Marking, a minimum of 40 percent of the total weight shall be manufactured using a molten kiln direct melt method. For Waterborne and Low VOC Paint, a minimum of 15 percent of the total weight shall be manufactured using a molten kiln direct melt method. All molten kiln direct melt glass beads shall be above the 600 µm (#30) sieve.

(9) Glass beads used for any type of pavement marking shall not contain more than 75 parts per million (ppm) arsenic, 75 ppm antimony and 100 ppm lead, as tested in accordance with EPA methods 3052 and 6010C, or other approved testing method

**REVISIONS OF SECTION 107**
**PROJECT PAYROLLS**

Section 107 of the Standard Specifications is hereby revised for this project as follows:

Subsection 107.01 shall include the following:

As related to the Form FHWA 1273, Required Contract Provisions Federal-Aid Construction Contracts, the Contractor shall check all Contractor and subcontractor project payrolls regarding accuracy of pay classification, pay hours, and pay rates. The Contractor shall sign and date all payrolls signifying this check has been performed.

**REVISION OF SECTION 107**
**RESPONSIBILITY FOR DAMAGE CLAIMS, INSURANCE TYPES AND COVERAGE LIMITS**

Section 107 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 107.15(c) and replace it with the following:

(c) Each insurance policy shall include provisions preventing cancellation or non-renewal without at least 30 days prior notice to Contractor. The Contractor shall forward to the Engineer any such notice received within seven days of the Contractor's receipt of such notice.

**REVISION OF SECTION 107**
**WARNING LIGHTS FOR WORK VEHICLES AND EQUIPMENT**

Section 107 of the Standard Specifications is hereby revised for this project as follows:

Subsection 107.06 (b) shall include the following:

All work vehicles and mobile equipment shall be equipped with one or more functioning warning lights mounted as high as practicable, which shall be capable of displaying in all directions one or more flashing, oscillating, or rotating lights for warning roadway traffic. The lights shall be amber in color. The warning lights shall be activated when the work vehicle or mobile equipment is operating within the roadway, right of way or both. All supplemental lights shall be SAE Class 1 certified.

**REVISION OF SECTIONS 107 & 208**
**WATER QUALITY CONTROL UNDER ONE ACRE OF DISTURBANCE**

Sections 107, 208, are hereby revised for this project as follows:

In subsection 107.25(b)6 delete the second paragraph and replace it with the following:

The Contractor shall record the location of potential pollutants on the plans. Descriptions of the potential pollutants shall be submitted to and approved by the Engineer.

In subsection 208.03 delete the first paragraph and replace it with the following:

Prior to construction the Contractor shall implement BMPs in accordance with the approved project schedule as described in subsection in 208.03(b).

In subsection 208.03 delete the third, fourth, and fifth paragraphs and replace them with the following:

The Contractor shall evaluate all non-stormwater coming onto the site, such as springs, seeps, and landscape irrigation return flow. If such flow is identified, BMPs shall be used to protect off-site water from becoming contaminated with sediment or other pollutants.

The Contractor shall review existing inlets and culverts to determine if inlet protection is needed due to water flow patterns. Prior to beginning construction, inlets and culverts needing protection shall be protected and the location of the implemented BMP added to the plans.

When additional BMPs are required and approved by the Engineer, the Contractor shall implement the additional BMPs and shall record and describe them on the plans. The approved BMPs will be measured and paid for in accordance with subsections 208.11 and 208.12.

Delete subsections 208.03(c) and (d) and replace them with the following:

(c) *Implementation, Maintenance and Revision of the SWMP.*

The Contractor's responsibilities shall be as follows:

(1) Install, construct, and maintain all BMPs specified in the Contract and coordinate the construction of BMPs with all other construction operations.

(2) Implement suitable temporary erosion and sediment control features as necessary to correct unforeseen conditions or emergency situations. Dismantle those features when their purpose has been fulfilled unless the Engineer directs that the features be left in place.

(3) Implement necessary actions to reduce anticipated or presently existing water quality or erosion problems resulting from construction activities.

(4) Make available, all labor, material, and equipment needed to install, maintain, and remove BMPs.

(5) When included in the Contract, the Contractor shall assign to the project an individual to serve in the capacity of Erosion Control Supervisor (ECS). The ECS may be the Superintendent. The ECS shall be experienced in all aspects of construction and have satisfactorily completed the Transportation Erosion Control Supervisor (TECS) training program authorized by the Department. Proof that this requirement has been met shall be submitted to the Engineer prior to or at the preconstruction conference. A list of authorized ECS training programs will be provided by the Engineer upon request by the Contractor. The ECS shall be the person responsible for ensuring that the responsibilities listed in (1) through (4) above are fulfilled

(d) *Documentation Available on the Project.* The following Contract documents and references will be made available for reference in one location on the project during construction:

1. Project Documents. The following documents shall be kept, maintained, and updated in a single notebook:

(1) SWMP Sheets
(2) SWMP site map, if applicable to the project.

(3) Details of BMPs used on the project not covered in Standard Plan M-208-1.
(4) List of potential pollutants as described in subsection 107.25.
(5) SPCC and reports of reportable spills submitted to CDPHE.
(6) Form 105s and all other correspondence relating to water quality.
(7) Project environmental permits and associated applications and certifications.

2. Reference Materials

(1) CDOT *Erosion Control and Stormwater Quality Guide.*
(2) CDOT *Erosion Control and Stormwater Quality Field Guide.*
(3) Copy of biological opinion, if applicable.

In subsection 208.04 delete the first and second paragraphs and replace them with the following:

The Contractor shall modify the SWMP to clearly describe and locate all BMPs implemented at the site to control potential sediment discharges from vehicle tracking.

Vehicle tracking pads shall be used at all vehicle and equipment access points to the site to prevent sediment exiting the project site onto paved public roads. Access shall be provided only at locations approved by the Engineer.

Delete subsection 208.04(e) and replace it with the following:

(e) *Stabilization.* Once earthwork has begun on a section, it shall be pursued until completion.

Clearing and grubbing operations shall be scheduled and performed so that grading operations and final stabilization measures can follow immediately thereafter if the project conditions permit. Otherwise temporary stabilization measures shall be taken between successive construction stages. Additional work required because the Contractor has failed to properly coordinate the entire erosion control schedule, thus causing previously seeded areas to be disturbed by operations that could have been performed prior to the seeding shall be performed at the Contractor's expense.

In subsection 208.06 delete the first paragraph and replace it with the following:

The Contractor shall clearly describe and record on the SWMP, all practices implemented at the site to minimize impacts from procedures or significant material that could contribute pollutants to runoff. Areas or procedures where potential spills can occur shall have spill contingency plans in place as specified in subsections 107.25(b)6 or 208.06(c).

In subsection 208.07 delete the second paragraph and replace it with the following:

Erodible stockpiles (including topsoil) shall be contained with acceptable BMPs at the toe (or within 20 feet of the toe) throughout construction. BMPs shall be approved by the Engineer.

In subsection 208.08, delete the first paragraph and replace it with the following:

The Contractor shall limit construction activities to those areas within the limits of disturbance shown on the plans and cross-sections. Construction activities, in addition to the Contract work, shall include the on-site parking of vehicles or equipment, on-site staging, on-site batch plants, haul roads or work access, and all other action which would disturb existing conditions. Off road staging areas must be pre-approved by the Engineer, unless otherwise designated in the Contract. Construction activities beyond the limits of disturbance due to Contractor negligence shall be restored to the original condition by the Contractor at the Contractor's expense. The Contractor shall tabulate additional disturbances not identified in the SWMP and indicate locations and quantities on the SWMP and report to the Engineer.

In subsection 208.09, second paragraph, delete the list and replace it with the following:

(1) Failure to include erosion control in the project schedule or failure to include erosion control in each schedule update as specified in subsection 208.03(b).
(2) Failure of the Contractor to implement necessary actions required by the Engineer as required by subsection 208.03(c).

(3) Failure to amend SWMP and implement BMPs as required by subsection 208.04.

(4) Failure to keep documentation and records current.

(5) Failure to construct or implement erosion control or spill containment measures required by the Contract, or failure to construct or implement them in accordance with the Contractor's approved schedule as required by subsection 208.06(c).

(6) Failure to stabilize disturbed areas as required by subsections 208.04(e) and 208.08.

(7) Failure to replace or perform maintenance on an erosion control feature after notice from the Engineer to replace or perform maintenance as required by subsection 208.04(f).

(8) Failure to remove and dispose of sediment from BMPs as required.

(9) Failure to install and properly utilize a concrete washout structure for containing washout from concrete placement operations.

(10) Failure to perform permanent stabilization as required by subsection 208.04 (e).

In subsection 208.09 delete the third paragraph and replace it with the following:

The Engineer will immediately notify the Contractor in writing of each incident of failure to perform erosion control in accordance with the Specifications, including, but not limited to items (1) through (10) above. Correction shall be made as soon as possible but no later than 48 hours from the date of notification to correct the failure. The Contractor will be charged liquidated damages in the amount of $875 for each calendar day after the 48 hour period has expired, that one or more of the incidents of failure to perform items (1) through (10) above, remains uncorrected.

In subsection 208.09 delete the eighth and ninth paragraphs and replace them with the following:

Disagreements regarding the suggested corrective action for a BMP compliance issue between the Project Engineer and Superintendent, shall be discussed with the Resident Engineer and Region Water Pollution Control Manager. If after meeting the Contractor is still in disagreement and feels that additional compensation is owed, the Contractor will follow the decision of the Project Engineer, keep track of the costs and negotiate further with the Project Engineer. If after pursuing the issue, the Contractor is unable to reach agreement with the Project Engineer, then the Contractor can follow the dispute process outlined in subsection 105.22.

If the Contractor's corrective action plan and schedule are not submitted and approved within 48 hours of the Stop Work Order or the corrective action plan is not implemented by the Contractor, the Engineer will have an on-site meeting with the Superintendent and the Superintendent's supervisor. This meeting will also be attended by the Resident Engineer, the Region Water Pollution Control Manager, and the Region Program Engineer. This meeting will identify and document needed corrective actions and a schedule for completion. If after the meeting, the unacceptable work is not remedied within the schedule as agreed to in the meeting, the Engineer will take action to effect compliance with the Contract by utilizing CDOT Maintenance personnel or other non-Contractor forces and deduct the cost from any moneys due or to become due to the Contractor pursuant to subsection 105.16. Delays due to these Stop Work Orders shall be considered nonexcusable. The Stop work Order shall be in place until the project is in Contract compliance.

Delete subsection 208.10 and replace it with the following:

**208.10 Items to Be Accomplished Prior to Final Acceptance.**

(a) *Reclamation of Washout Areas*. After concrete operations are complete, washout areas shall be reclaimed in accordance with subsection 208.05(n) at the Contractor's expense.

(b) *Survey.* The Contractor shall survey Permanent Water Quality BMPs (Permanent BMPs) on the project after they are constructed and confirm they are at final configuration and grade. The Engineer will identify which Permanent BMPs shall be surveyed prior to the final walk through. The survey shall be performed in accordance with Section 625.

(c) *Removal of Temporary BMPs.* Temporary BMPs subject to removal shall be determined by the Engineer at a final walk through of the project and shall be removed by the Contractor. If any BMPs are left in place, the Region's Water Pollution Control Manager shall be notified of the BMP locations.

**REVISION OF SECTION 108**
**DELAY AND EXTENSION OF CONTRACT TIME**

Section 108 of the Standard Specifications is hereby revised for this project as follows:

In subsection 108.08, delete (c) and (d) and replace with the following:

*(c) Delay.* Any event, action or factor that extends the performance period of the Contract.

1. *Excusable Delay:* A delay that was beyond the Contractor's control and was not due to the Contractor's fault or negligence. The Department may grant a contract time extension for an excusable delay.

   A. *Compensable Delay*: A delay that the Department, not the Contractor, is responsible for entitling the *Contractor* to a time extension and monetary compensation. Monetary compensation for compensable delays will be made in accordance with Subsection 109.10.

   B. *Noncompensable Delay:* An excusable delay that neither the Contractor nor the Department is responsible for that may entitle the Contractor to a contract time extension but no additional monetary compensation. Contract time allowed for the performance of the work may be extended for delays due to force majeure (i.e. acts of God, acts of the public enemy, terrorist acts, fires, floods, area wide strikes, embargoes, or unusually severe weather).

2. *Nonexcusable Delay*: A delay that was reasonably foreseeable or within the control of the Contractor for which the Department will not grant monetary compensation or a contract time extension.

3. *Concurrent Delay.* Independent delays to critical activities occurring at the same time.

   A. The *Department* will not grant a time extension or additional compensation for the period of time that a non-excusable delay is concurrent with an excusable delay.

   B. The Department may grant time but no compensation for the period of time that a non-compensable delay is concurrent with a compensable delay.

Delays in delivery of materials or fabrication scheduling resulting from late ordering, financial considerations, or other causes that could have been foreseen or prevented will be considered nonexcusable delays. However, delays caused by fuel shortage or delay in delivery of materials to the Contractor due to some unusual market condition caused by industry-wide strike, national disaster, area-wide shortage, or other reasons beyond the control of the Contractor which prevent procurement of materials or fuel within the allowable contract time limits will be considered excusable delays.

*(d) Extension of Contract Time.* The Contractor's assertion that insufficient contract time was specified is not a valid reason for an extension of contract time. For time extension requests, the Contractor shall provide a two-part submittal: part one shall consist of a written notice of the delay and part two shall consist of the Contractor's delay documentation and supporting analysis.

Part 1: The Contractor shall provide the written notice of delay within seven days of the delay occurrence. The notice shall describe the delay and include documentation substantiating the nature and cause of the delay. Failure to submit the written notice constitutes a waiver of entitlement to additional time or compensation.
Part 2: This shall be submitted within 30 days of the written notice. The Contractor shall include all documentation needed to support the time extension request. In order to request additional contract time for an unexpected delay, the Contractor shall provide a contemporaneous schedule analysis in accordance with subsection 108.03. The schedule

analysis shall show that the delayed activity or activities were on the critical path or became critical due to the delay.

The Engineer will base a determination of an allowable contract time extension on:

(1) The current Schedule in effect at the time of the alleged delay;
(2) The supporting documentation submitted by the Contractor;
(3) The contemporaneous schedule analysis; and
(4) Any other relevant information available to the Engineer.

For a time extension request resulting from a change order, the Contractor shall demonstrate the delay to the project completion date by:

(1) Inserting a fragnet containing the change order activities into an unprogressed copy of the schedule that is current at the time of the change order;
(2) tying the fragnet into the schedule logic; and
(3) Recalculating the schedule.

The Department will not consider delays to activities which do not affect the performance period of the Contract as a basis for a Contract time extension. If the Engineer grants a contract time extension, the revised Contract Completion date will be in effect as though it were the original contract date.

A Contractor's failure to have an approved, or approved with comments, current project schedule in place will preclude the Department from considering a Contractor's a time extension request.

**REVISION OF SECTION 108**
**LIQUIDATED DAMAGES**

Section 108 of the Standard Specifications is hereby revised for this project as follows:

In subsection 108.09, delete the Schedule of Liquidated Damages and replace with the following:

| **Original Contract Amount ($)** | | **Liquidated Damages per Calendar Day ($)** |
|---|---|---|
| **From More Than** | **To And Including** | |
| **0** | **150,000** | **500** |
| **150,000** | **500,000** | **1,000** |
| **500,000** | **1,000,000** | **1,600** |
| **1,000,000** | **2,000,000** | **2,300** |
| **2,000,000** | **4,000,000** | **4,100** |
| **4,000,000** | **10,000,000** | **5,800** |
| **10,000,000** | ---------- | 5,800 plus 1,600 Per Each Additional 1,000,000 Contract Amount or Part Thereof Over 10,000,000 |

**REVISION OF SECTION 108**
**NOTICE TO PROCEED**

Section 108 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 108.02 and replace with the following:

**108.02 Notice to Proceed.** The Contractor shall not commence work prior to the issuance of a Notice to Proceed. The "Notice to Proceed" will stipulate the date on which contract time commences. When the Contractor proceeds with work prior to that date, contract time will commence on the date work actually begins. The Contractor shall commence work under the Contract on or prior to the 15th day following Contract execution or the 30th day following the date of award, whichever comes later, or in accordance with the selected start date allowed in the special provisions.

**REVISION OF SECTION 108**
**PROJECT SCHEDULE**

Section 108 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 108.03 and replace with the following:

**108.03 Project Schedule.**

(a) *Definitions.*

Activity. An activity is a project element on a schedule that affects completion of the project. An activity has a description, start date, finish date, duration, and one or more logic ties.

Activity ID. A unique, alphanumeric, identification code assigned to an activity and remains constant throughout the project.

Bar Chart. A simple depiction of a Project Schedule without relationships or supporting logic of the schedule.

Calendar. Defined work periods and no work periods that determine when project activities can occur. Multiple calendars may be used for different activities; e.g., a 5-day work-week and a 7-day work-week calendar.

Constraint. A restriction imposed in a schedule, which fixes a value that would otherwise be calculated within the schedule. Examples of values that can be fixed by a constraint include start date, end date, and completion date.

Critical Path. The sequence of activities that determines the duration of the project.

Critical Path Method Scheduling. (CPM Scheduling) is a logic-based planning technique using activity durations and relationships between activities to calculate a schedule determining the minimum total project duration.

Data Date. The starting point from which to schedule all remaining work.

Duration. The estimated amount of time needed to complete an activity.

Float. The amount of time between the earliest date an activity can start and the latest date when an activity must start ,or the earliest date an activity can finish and latest date when an activity can finish before the activity becomes critical. The time between the Project Schedule completion date and the Contract completion date is not considered float.

Gantt Chart. A time-scaled graphical display of the project's schedule.

Lag. A time-value assigned to a relationship.

Logic. Relationships between activities defining the sequence of work (See also predecessor activity and successor activity).

Milestone. An activity, with no duration used to represent an event.

Open-Ended Activity. An activity that does not have both a predecessor activity and a successor activity.

Predecessor Activity. An activity that is defined by schedule logic to precede another activity.

Relationship. The interdependence between activities.

Salient Feature. An item of work that is of special interest for CDOT in coordinating the project schedule but may not affect the overall completion of the project.

Successor Activity. An activity that is defined by schedule logic to follow another activity.

Time-Scaled Logic Diagram. Gantt chart that illustrates logic links depicting both schedule logic and the time at which activities are performed.

(b) *Project Schedule* **-** *General*

The Contractor shall use either Microsoft Project or Primavera Scheduling software to develop and manage a CPM Project Schedule to plan, schedule, and report the progress of the work. Prior to, or at the Pre-construction Conference, the Contractor shall notify the Engineer in writing, which scheduling software the Contractor shall use to manage the project. The Contractor's selection and use of particular scheduling software cannot be changed after the first schedule submittal. If the Contractor selects Primavera, the Contractor shall calculate the schedule using the Retained Logic scheduling option. The Department will not allow use of bar charts for the Project Schedule.

The Contractor shall submit schedules for approval by the Engineer. The purpose of these schedules is to allow the Contractor and the Department to jointly manage the work and evaluate progress. The schedules also serve to evaluate the affect of changes and delays to the scheduled project completion. Either party may require a formal schedule review meeting.

The Contractor's schedule shall consist of a time-scaled logic diagram and shall show the logical progression of all activities required to complete the work.

The Contractor shall use activity descriptions that ensure the work is easily identifiable. The Contractor shall show the no-work days in the schedule calendars.

The Contractor shall use durations for individual construction activities that do not exceed 15 calendar days unless approved by the Engineer. The Contractor may group a series of activities with an aggregate duration of five days or less into a single activity. Non-construction activities may have durations exceeding 15 working days, as approved by the Engineer.

The Contractor may include summary bars in the schedule as long as the detailed activities to complete the work are displayed.

The Contractor shall not use the following:

(1) Negative lags

(2) Lags in excess of 10 working days without approval by the Engineer. The Contractor's written request shall justify the need for the lag. Lags shall be identified.

(3) Start-to-finish relationships.

(4) Open-ended activities - every activity shall have at least one predecessor activity and at least one successor activity, except for the first and last activities in the network. If the contractor uses a start-to-start relationship to link two activities, then both of those two activities should also have successor activities linked by either a finish-to-start or a finish-to-finish relationship.

(5) Constraints without approval by the Engineer. The Contractor's written request shall explain why the use of constraints in the schedule is necessary.

The Project Schedule shall show all activities required by all parties to complete the work. The Project Schedule shall include subcontracted work, delivery dates for critical material, submittal and review periods, permits and governmental approvals, milestone requirements, utility work by others and no work periods. The Contractor, its subcontractors, suppliers, and engineers, at any tier, shall perform the work according to the approved Project Schedule.

Float within the Baseline Schedule or any other Project Schedule is not for the exclusive use or benefit of either party, but is a project resource available to both parties as needed until it is depleted.

For any schedule submittal that shows completion in less than 85 percent of the Contract Time, the Contractor shall submit planned production rates in the schedule for all activities with float of 10 days or less. The Engineer may require additional methods statements for activities with float of 10 days or less.

The Engineer's review of the schedule will not exceed 10 calendar days. The Engineer will provide the Contractor with one of the following responses within 10 days after receipt of the Project Schedule:

(1) Approved, no exceptions taken;
(2) Approved-as-Noted; or
(3) Revise and Resubmit within 10 days.

The Contractor shall not assume that approval of the Project Schedule relieves the Contractor of its obligation to complete all work within the Contract Time.

(c) *Schedule Submittals.* The Contractor shall include a time-scaled logic diagram with all schedule submittals that:

(1) Is plotted on a horizontal time-scale in accordance with the project calendar.

(2) Uses color to clearly identify the critical path.

(3) Is based on early start and early finish dates of activities.

(4) For Schedule Updates and Schedule Revisions, shows actual completion dates up to but not including the data date.

(5) Clearly shows the sequence and relationships of all activities necessary to complete the contract work.

(6) Includes an activity block for each activity with the following information:

| | |
|---|---|
| **Activity ID** | **Activity Description** |
| **Original Duration** | Total Float |
| **Early start date** | Early finish date |
| **Late start date*** | Late finish date* |
| **Actual Start date^** | Actual Finish date^ |
| **Calendar used on the activity** | Activity Responsibility |
| **Remaining Duration^** | Duration Percent Complete^ |
| **Gantt chart (time-scaled logic diagram)** | |
| ***Required with the Preliminary and Baseline Schedule.** | |
| **^Required with the Project Schedule Update and Schedule Revision.** | |

The Contractor shall include the following with all schedule submittals:

(1) A Job Progress Narrative Report that includes the following:
(i) A description of the work performed since the previous month's schedule update.
(ii) A description of problems encountered or anticipated since the previous month's schedule submission.

(iii) A description of unusual labor, shift, equipment, or material conditions or restrictions encountered or anticipated.
(iv) The status of all pending items that could affect the schedule.
(v) Explanations for milestones forecasted to occur late.
(vi) Scheduled completion date status and any change from the previous month's submission.
(vii) An explanation for a scheduled completion date forecasted to occur before or after the contract completion date or contract time.
(viii) Schedule Delays:
1. A description of current and anticipated delays including: Identification of the delayed activity or activities by Activity ID(s) and description(s).
2. Delay type with reference to the relevant specification subsection.
3. Delay cause or causes.
4. Effect of the delay on other activities, milestones, and completion dates.
5. Identification of the actions needed to avoid a potential or mitigate an actual delay.
6. A description of the critical path impact and effect on the scheduled completion date in the previous month's schedule update.

(ix) A list of all added and deleted activities along with an explanation for the change.
(x) All logic and duration changes along with an explanation for the change.

(2) A Predecessor Activity and Successor Activity report that defines all schedule logic and clearly indicates all logical relationships and constraints.
(3) An Early Start report listing all activities, sorted by actual start/early start date.
(4) A Float report listing all activities sorted in ascending order of available float.
(5) A Critical Path report listing all activities not yet complete with the percent complete, sorted by float and then by early start.
(6) A listing of all non-work days.

For all required schedule submittals, the Contractor shall submit two electronic copies on two compact disk, USB flash drive, or other media as directed by the Engineer. Electronic copies of CPM schedules shall be submitted both in the native schedule format and in "PDF" format. The Contractor shall also provide two printed copies of the CPM Schedule and all reports.

Each schedule submittal shall be appropriately labeled as a Preliminary Schedule, Baseline Schedule, Project Schedule Update, or Schedule Revision. The title bar shall include the CDOT project number, subaccount, project name, contractor name, schedule data date. If an originally submitted schedule is revised during review, the title bar shall also include a revision number (REV1, REV2, etc.) and revision date.

(d) *Preliminary Schedule.* Within 14 days of award of the Contract, the Contractor may submit a Preliminary Schedule showing all planned activities from the Notice to Proceed through the first 60 days of the project. If the Contractor elects not to submit a Preliminary Schedule, then the Contractor shall submit a complete Baseline Schedule within 14 days of award of the Contract, which will be subject to all requirements of a Baseline submittal. The Preliminary Schedule shall not show any progress and it will be approved by the Engineer before work can commence. The Preliminary Schedule shall be used as the basis for the Baseline Schedule.

(e) *Baseline Schedule.* If the Contractor elects to submit a Preliminary Schedule, within 45 days of the award of Contract, the Contractor shall submit a Baseline Schedule that includes all work activities completed within Contract Time. The Contractor shall not show progress in the Baseline Schedule. Further partial payments will not be made beyond 60 days after the start of Contract Time unless the Baseline Schedule is approved. When approved, the Baseline Schedule shall become the Project Schedule.

The Contractor shall use all information known by the Contractor at the time of bid submittal to develop the Baseline Schedule.

If the Contractor elects to submit a Baseline Schedule in lieu of a Preliminary Schedule, the Baseline Schedule shall be approved before work can commence.

(f) *Methods Statements.* The Contractor shall submit a Methods Statement for each salient feature or as directed by the Engineer that describes all work necessary to complete the feature. The Contractor shall include the following information in the Methods Statement:
(1) Salient feature name;
(2) Responsibility for the salient feature work;
(3) Planned work procedures;
(4) The planned quantity of work per day for each salient feature using the same units of measure as the applicable pay item;
(5) The anticipated labor force by labor type;
(6) The number, types, and capacities of equipment planned for the work;
(7) The planned time for the work including the number of work days per week, number of shifts per day, and the number of hours per shift.

(g) *Project Schedule Update.* The Contractor shall submit a monthly update of the Project Schedule updated through the cut-off date for the monthly progress pay estimate, and a projection for completing all remaining activities. A schedule update may show a completion date that is different than the Contract completion date, after the baseline schedule is approved. Approval of this schedule shall not relieve the Contractor of its obligation to complete the work within the Contract Time. In this case, the Contractor shall provide an explanation for a late scheduled completion date in the Job Progress Narrative Report included with the schedule submittal.

When approved, the Project Schedule Update will become the Project Schedule. The Engineer will not issue a monthly progress payment if the Engineer has not received the Project Schedule Update. The Engineer will not make monthly progress payments for the months following the Project Schedule Update submission until the Engineer approves the Project Schedule Update.

When the project has a maintenance or landscape establishment period, the Engineer may waive the monthly update requirement. The Contractor shall submit a final Project Schedule Update that shows all work through the final acceptance date.

(h) *Weekly Planning Schedule.* The Contractor shall submit, in writing, a Weekly Planning Schedule that shows the Contractor's and all Subcontractor's planned activities for a minimum of two weeks immediately following the date of submittal and actual days worked versus planned for the week prior to the date of submittal. This schedule shall include the description, duration and sequence of work activities and anticipated lane closures for the upcoming two weeks. The Weekly Planning Schedule may be a time-scaled logic diagram or other standard format as approved by the Engineer. subsection 108.03(c) Schedule Submittal requirements for reports do not apply to the Weekly Planning Schedule.

(i) *Schedule Revision.* A Schedule Revision is required in the event of any major change to the work. Examples of major changes are:

(1) Significant changes in logic or methods of construction or changes to the critical path;
(2) Addition, deletion, or revision of activities required by contract modification order;
(3) Approval of a Contractor submitted Value Engineering Change Proposal;
(4) Delays in milestones or project completion;
(5) Phasing revisions, or;
(6) If the Engineer determines that the schedule does not reflect the actual work.

This revision shall include a description of the measures necessary to achieve completion of the work within the Contract Time. The Contractor may also need to submit revised Methods Statements. The Contractor shall provide a Schedule Revision within 10 days of written notification and shall include the diagrams and reports as described in subsection 108.03 (b) Schedule - General and (c) Schedule Submittals. In this case, the Contractor shall provide an explanation for a late scheduled completion date in the Job Progress Narrative Report included with the schedule.

Once approved, the Schedule Revision becomes the Project Schedule.

(j) *Payment.* All costs relating to the requirements of this subsection will not be paid for separately, but shall be included in the work.

**REVISION OF SECTION 108**
**SUBLETTING OF CONTRACT**

Section 108 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 108.01 and replace with the following:

**108.01 Subletting of Contract.** The Contractor shall not sublet, sell, transfer, assign, or dispose of the Contract or Contracts, or any portion thereof without written permission of the Engineer. Prior to beginning any work by subcontractor, the Contractor shall request permission from the Engineer by submitting a completed Sublet Permit Application, CDOT Form No. 205. The subcontract work shall not begin until the Contractor has received the Engineer's written permission. The Contractor shall make all project related written subcontracts, agreements, and purchase orders available to the Engineer for viewing, upon request and at a location convenient to the Engineer.

The Contractor will be permitted to sublet a portion of the Contract, however, the Contractor's organization shall perform work amounting to 30 percent or more of the total original contract amount. Any items designated in the contract as "specialty items" may be performed by subcontract. The cost of "specialty items" so performed by subcontract may be deducted from the total original contract amount before computing the amount of work required to be performed by the Contractor's own organization. The original contract amount includes the cost of material and manufactured products which are to be purchased or produced by the Contractor and the actual agreement amounts between the Contractor and a subcontractor. Proportional value of a subcontracted partial contract item will be verified by the Engineer. When a firm both sells material to a prime contractor and performs the work of incorporating the materials into the project, these two phases shall be considered in combination and as constituting a single subcontract.

The calculation of the percentage of subcontracted work shall be based on subcontract unit prices.

Subcontracts or transfer of Contract shall not release the Contractor of liability under the Contract and Bond.

**REVISION OF SECTION 108**
**PAYMENT SCHEDULE (SINGLE FISCAL YEAR)**

Section 108 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 108.04, and replace with the following:

**108.04 Payment Schedule.** The Contractor shall prepare a payment schedule which shall show the dollar amount of work the Contractor expects to be complete within a single State Fiscal Year (July 1 to June 30). The schedule shall cover the period from the commencement of work to the expected completion date as shown on the Contractor's progress schedule. The payment schedule may be prepared using standard spreadsheet software such as MS Excel and submitted in electronic format.

The Contractor shall submit the payment schedule at the preconstruction conference.

The amounts shown shall include planned force account work and expected incentive payments.

If the Contractor fails to submit the payment schedule by the required date, the Engineer will withhold further progress payments until such time as the Contractor has submitted it.

**REVISION OF SECTION 109**
**COMPENSATION FOR COMPENSABLE DELAYS**

In subsection 109.10, delete the first two paragraphs and replace with the following:

**109.10 Compensation for Compensable Delays.** If the Engineer determines that a delay is compensable in accordance with either subsection 105.22, 105.23, 105.24, or 108.08, monetary compensation will be determined in accordance with this subsection.

(a) These categories represent the only costs that are recoverable by the Contractor. All other costs or categories of costs are not recoverable:

(1) Actual wages and benefits, including FICA, paid for additional labor not otherwise included in (5) below;
(2) Costs for additional bond, insurance and tax;
(3) Increased costs for materials;
(4) Equipment costs calculated in accordance with subsection 109.04(c) for Contractor owned equipment and based on invoice costs for rented equipment;
(5) Costs of extended job site overhead;
(6) Costs of salaried employees not otherwise included in (1) or (5) above incurred as a direct result of the delay;
(7) Claims from subcontractors and suppliers at any level (the same level of detail as specified herein is required for all such claims);
(8) An additional 16 percent will be added to the total of items (1) through (7) as compensation for items for which no specific allowance is provided, including profit and home office overhead.

**REVISION OF SECTION 109**
**MEASUREMENT OF QUANTITIES**

Section 109 of the Standard Specifications is hereby revised for this project as follows:

In subsection 109.01, delete the 17th paragraph and replace it with the following:

Vehicles used to haul material being paid for by weight shall bear a plainly legible identification mark. Each of these vehicles shall be weighed empty daily at times directed by the Engineer. The Contractor shall furnish to the Engineer, in writing, a vehicle identification sheet that lists the following for each delivery vehicle to be used on the project:

(1) identification mark
(2) vehicle length
(3) tare weight
(4) number of axles
(5) the distance between extreme axles
(6) information related to legal weight, including the Permit No. and permitted weight of each vehicle for which the State has issued an overweight permit.

This information shall be furnished prior to time of delivery of the material and at any subsequent time the Contractor changes vehicles, combination vehicles, axle length relationships, or overweight permitting of vehicles.

**REVISION OF SECTION 109**
**MEASUREMENT OF WATER**

Section 109 of the Standard Specifications is hereby revised for this project as follows:

In subsection 109.01, delete the twenty-sixth paragraph and replace with the following:

Water may be measured either by volume or weight. Water meters shall be accurate within a range of ± 3 percent. When water is metered, the Contractor shall use an approved metering device and shall furnish the Engineer a certificate showing the meter has been accurately calibrated within the time allowed in the following schedule:

| | |
|---|---|
| 2 inch | 4 years |
| 4 inch to 6 inch | 2 years |
| 8 inch to 10 inch | 1 year |

**REVISION OF SECTION 109**
**PROMPT PAYMENT**

Section 109 of the Standard Specifications is hereby revised to include the following:

Subsection 109.06 (e) shall include the following:

The Contractor shall submit the Form 1418, Monthly Payment Report, along with the project schedule updates, in accordance with subsections 108.03 (b) or 108.03 (c) (3). Failure to submit a complete and accurate Form 1418 shall be grounds for CDOT to withhold subsequent payments or retainage to the Contractor.

**REVISION OF SECTION 203**
**IMPORTED MATERIAL FOR EMBANKMENT**

Section 203 of the Standard Specifications is hereby revised for this project as follows:

Subsection 203.03 (a) shall include the following:

Imported Material used for backfilling pipes (storm sewer, cross culverts, side drains, etc) shall be tested for compatibility with the selected pipe material.

When Nonreinforced Concrete Pipe or Reinforced Concrete Pipe is used, the imported material shall be tested for sulfate and pH

When Corrugated Steel Pipe, Bituminous Coated Corrugated Steel Pipe or Precoated Corrugated Steel Pipe is used, the imported material shall be tested for sulfates, chlorides, pH and resistivity.

When Aramid Fiber Bonded Corrugated Steel Pipe or Corrugated Aluminum Pipe is used, the imported material shall be tested for pH and resistivity.

When Plastic pipe is selected, the imported material does not need to be tested for sulfates, chlorides, pH and resistivity.

Sulfates, chlorides, pH and resistivity shall be determined by the following procedures:

(1) Water soluble sulfates using CP-L 2103 Method B.
(2) Chlorides using CPL 2104
(3) Resistivity using ASTM G57
(4) pH using ASTM G51.

The average of three consecutive tests shall show the imported material's sulfate, chloride, pH and resistivity is not greater than the limits corresponding to the Pipe Class in Table 203-1 or 203-2 for the pipe class specified on the plans. No single test shall have a result more than 20 percent greater than that corresponding to the limit in Table 203-1 or Table 203-2 for sulfates, chlorides and resistivity. No single test shall have a result more than 5 percent outside the limit in Table 203-1 for pH. The remaining sample material from a single failing test shall be split into three equal portions. CDOT shall receive one portion, the Contractor shall receive one portion and the remaining portion shall be retained by the Project. CDOT and the Contractor's Lab shall retest the failed sample; if the results from those tests are within 10 percent of each other, the results will be averaged. The averaged result will be used for Contract compliance. If the results from the Labs are not within 10 percent of each other, the remaining sample portion will be sent to an independent laboratory for testing using the testing requirements specified above. The independent laboratory will be mutually agreed upon by the Department and the Contractor. The Independent Lab's test result will be used for Contract compliance.

If the imported material's sulfates, chlorides, and resistivity are less than the limits and the pH is within the limits in Table 203-1 or 203-2, CDOT will bear all costs associated with the independent lab test. If the imported material's sulfates, chlorides, and resistivity is greater than the limits and the pH is outside the limits in Table 203-1 or 203-2,, all costs associated with independent lab testing shall be at the Contractor's expense.

Embankment represented by failing tests shall be removed from the project and replaced at the Contractor's expense.

**Table 203-1**
**SULFATE, CHLORIDE AND PH OF IMPORTED MATERIAL**

| | SOIL | | |
|---|---|---|---|
| Pipe Class | Sulfate | Chloride | |
| | ($SO_4$) | (Cl) | pH |
| | % max | % max | |
| 0 , 7 | 0.05 | 0.05 | 6.0-8.5 |
| 1, 7 | 0.10 | 0.10 | 6.0-8.5 |
| 2, 8 | 0.20 | 0.20 | 6.0-8.5 |
| 3, 9 | 0.50 | 0.50 | 6.0-8.5 |
| 4, 9 | 1.00 | 1.00 | 5.0-9.0 |
| 5, 10 | 2.00 | 2.00 | 5.0-9.0 |
| 6, 10 | >2.00 | >2.00 | <5 or >9 |

**Table 203-2**
**RESISTIVITY AND PH OF IMPORTED MATERIAL**

| SOIL SIDE | |
|---|---|
| Resistivity, R (Ohm – cm) | pH |
| ≥1,500 | 5.0-9.0 |
| ≥250 | 3.0-12.0 |

**REVISION OF SECTIONS 203, 206, 304, 613**
**COMPACTION**

Sections 203, 206, 304 and 613 of Standard Specifications are hereby revised for this project as follows:

In subsection 203.03 (a), delete the fifth paragraph and replace with the following:

1. *Soil Embankment.* Soil embankment consists of materials with 50 percent or more of the material passing the 4.75 mm (No. 4) sieve.

   A soil embankment may also have more than 50 percent of the material retained on the 4.75 mm (No. 4) sieve, but no more than 30 percent of the material retained on the 19 mm (3/4 inch) sieve.

   Soil embankment shall be constructed with moisture density control in accordance with the requirements of subsection 203.07.

2. *Rock Embankment.* Rock embankment consist of materials with 50 percent or more of the material retained on the 4.75 mm (No. 4) sieve and with more than 30 percent of the material retained on the 19 mm (3/4 inch) sieve. All material shall be smaller than 6 inches. Rock embankments shall be constructed without moisture density control in accordance with the requirements of subsection 203.08.

Delete Subsection 203.07 and replace with the following:

**203.07 Construction of Embankment and Treatment of Cut Areas with Moisture and Density Control.** Soil embankments shall be constructed with moisture and density control and the soil upon which the embankments are to be constructed shall be scarified to a depth of 6 inches and compacted with moisture and density control. The moisture content of the soil at the time of compaction shall be as specified or directed.

The material shall be removed from the full width of roadbed in all cut sections to the designated depth. The soil below the designated depth shall be thoroughly scarified to a depth of 6 inches and the moisture content increased or reduced, as necessary, to obtain the moisture content specified. This scarified layer shall then be compacted to the relative compaction specified.

All embankment material shall be compacted to not less than 95 percent relative compaction. Maximum dry density of all soil types encountered or used will be determined in accordance with AASHTO T 99 as modified by CP 23.

Soils shall be compacted at ± 2 percent of Optimum Moisture Content (OMC) as determined by AASTHO T 99. Soils having greater than 35 percent passing the 75 µm (No. 200) sieve shall be compacted to 0 to 3 percent above OMC. Soils which are unstable at the above moisture content shall be compacted at lower moisture content to the specified density.

Additional work involved in drying embankment material to the required moisture content shall be included in the contract price paid for excavating or furnishing the material with no additional compensation.

Density requirements will not apply to materials which cannot be tested in accordance with the above procedures for determining maximum dry density. Compaction for materials which cannot be tested shall be in accordance with subsection 203.08.

Claystone or soil-like non-durable shale shall be pulverized and compacted to the specified moisture and percent of relative compaction and shall be compacted with a heavy tamping foot roller, weighing at least 30 tons. Each tamping foot roller shall protrude from the drum a minimum of 4 inches. Each embankment layer shall receive a minimum of three or more coverages with the tamping foot roller to

obtain density. One coverage consists of one pass over the entire surface designated. One pass consists of the passing of an acceptable tamping foot roller over a given spot. The roller shall be operated at a uniform speed not exceeding 3 miles per hour. No additional compensation will be made for additional roller coverages to achieve specified density requirements.

In subsection 206.03, delete the fourth and fifth paragraphs and replace with the following:

Backfill shall consist of approved materials uniformly distributed in layers brought up equally on all sides of the structure. Each layer of backfill shall not exceed 6 inches before compacting to the required density and before successive layers are placed. Structure backfill (Class 1) shall be compacted to a density of not less than 95 percent of maximum dry density determined in accordance with AASHTO T 180 as modified by CP 23. Backfill shall be compacted at ± 2 percent of Optimum Moisture Content (OMC).

Structure backfill (Class 2) shall be compacted to a density of not less than 95 percent of maximum dry density. The maximum dry density and OMC for A-1, A-2-4. A-2-5 and A-3 materials will be determined in accordance with AASHTO T 180 as modified by CP 23. The maximum dry density and OMC for all other materials will be determined in accordance with AASHTO T 99 as modified by CP 23. Materials shall be compacted at ± 2percent of Optimum Moisture Content (OMC). Materials having greater than 35 percent passing the 75 µm (No. 200) sieve shall be compacted at 0 to 3 percent above OMC.

In subsection 304.06, delete the first paragraph and replace with the following:

**304.06 Shaping and Compaction.** Compaction of each layer shall continue until a density of not less than 95 percent of the maximum density determined in accordance with AASHTO T 180 as modified by CP 23 has been achieved. The moisture content shall be at +/-2 percent of optimum moisture content. The surface of each layer shall be maintained during the compaction operations so that a uniform texture is produced and the aggregates are firmly keyed. Moisture conditioning shall be performed uniformly during compaction.

In subsection 613.07, delete the 15th paragraph and replace with the following:

Trenching shall be backfilled and compacted as follows: Backfill shall be deposited in uniform layers. The thickness of each layer shall be 6 inches or less thick prior to compaction. The space under the conduit shall be completely filled. The remainder of the trench and excavation shall be backfilled to the finished grade. The backfill material shall be compacted to the density of not less than 95 percent of maximum dry density. The maximum dry density and optimum moisture content (OMC) for A-1, A-2-4. A-2-5 and A-3 materials will determined in accordance with AASHTO T 180 as modified by CP 23. The maximum dry density and OMC for all other materials will determined in accordance with AASHTO T 99 as modified by CP 23. Materials shall be compacted at ± 2percent of Optimum Moisture Content (OMC). Materials having greater than 35 percent passing the 75 µm (No. 200) sieve shall be compacted at 0 to 3 percent above OMC. Each layer shall be mechanically compacted by tamping with power tools approved by the Engineer. Compaction methods or equipment that damage the conduit shall not be used.

**REVISION OF SECTION 206**
**IMPORTED MATERIAL FOR STRUCTURE BACKFILL**

Section 206 of the Standard Specifications is hereby revised for this project as follows:

Subsection 206.02 (a) shall include the following:

Imported Material used as structure backfill for pipes (storm sewer, cross culverts, side drains, etc) shall be tested for compatibility with the selected pipe material.

When Nonreinforced Concrete Pipe or Reinforced Concrete Pipe is used, the imported material shall be tested for sulfate and pH.

When Corrugated Steel Pipe, Bituminous Coated Corrugated Steel Pipe or Precoated Corrugated Steel Pipe is used, the imported material shall be tested for sulfates, chlorides, pH and resistivity.

When Aramid Fiber Bonded Corrugated Steel Pipe or Corrugated Aluminum Pipe is used, the imported material shall be tested for pH and resistivity.

When Plastic pipe is selected, the imported material does not need to be tested for sulfates, chlorides, pH and resistivity.

Sulfates, chlorides, pH and resistivity shall be determined by the following procedures:

(5) Water soluble sulfates using CP-L 2103 Method B.
(6) Chlorides using CPL 2104
(7) Resistivity using ASTM G57
(8) pH using ASTM G51.

The average of three consecutive tests shall show the imported material's sulfate, chloride, pH and resistivity is not greater than the limits corresponding to the Pipe Class in Table 206-1 or 206-2 for the pipe class specified on the plans. No single test shall have a result more than 20 percent greater than that corresponding to the limit in Table 206-1 or Table 206-2 for sulfates, chlorides and resistivity. No single test shall have a result more than 5 percent outside the limit in Table 206-1 for pH. The remaining sample material from a single failing test shall be split into three equal portions. CDOT shall receive one portion, the Contractor shall receive one portion and the remaining portion shall be retained by the Project. CDOT and the Contractor's Lab shall retest the failed sample; if the results from those tests are within 10 percent of each other, the results will be averaged. The averaged result will be used for Contract compliance. If the results from the Labs are not within 10 percent of each other, the remaining sample portion will be sent to an independent laboratory for testing using the testing requirements specified above. The independent laboratory will be mutually agreed upon by the Department and the Contractor. The Independent Lab's test result will be used for Contract compliance.

If the imported material's sulfates, chlorides, and resistivity are less than the limits and the pH is within the limits in Table 203-1 or 203-2, CDOT will bear all costs associated with the independent lab test. If the imported material's sulfates, chlorides, and resistivity is greater than the limits and the pH is outside the limits in Table 206-1 or 206-2, all costs associated with independent lab testing shall be at the Contractor's expense.
Embankment represented by failing tests shall be removed from the project and replaced at the Contractor's expense.

**Table 206-1**
**SULFATE, CHLORIDE AND PH OF IMPORTED MATERIAL**

| | **SOIL** |
|---|---|

| Pipe Class | Sulfate ($SO_4$) % max | Chloride (Cl) % max | pH |
|---|---|---|---|
| 0 , 7 | 0.05 | 0.05 | 6.0-8.5 |
| 1, 7 | 0.10 | 0.10 | 6.0-8.5 |
| 2, 8 | 0.20 | 0.20 | 6.0-8.5 |
| 3, 9 | 0.50 | 0.50 | 6.0-8.5 |
| 4, 9 | 1.00 | 1.00 | 5.0-9.0 |
| 5, 10 | 2.00 | 2.00 | 5.0-9.0 |
| 6, 10 | >2.00 | >2.00 | <5 or >9 |

**Table 206-2**
**RESISTIVITY AND PH OF IMPORTED MATERIAL**

| **SOIL SIDE** | |
|---|---|
| Resistivity, R (Ohm – cm) | pH |
| ≥1,500 | 5.0-9.0 |
| ≥250 | 3.0-12.0 |

**REVISION OF SECTION 206**
**STRUCTURE BACKFILL (FLOW-FILL)**

Section 206 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 206.02 (a) and replace with the following:

(a) *Structure Backfill.* Class 1 and Class 2 structure backfill shall be composed of non-organic mineral aggregates and soil from excavations, borrow pits, or other sources. Material shall conform to the requirements of subsection 703.08. Class of material shall be as specified in the Contract or as designated.

Structure backfill (Flow-Fill) meeting the following requirements shall be used to backfill bridge abutments. The Contractor may substitute structure backfill (Flow-Fill) for structure backfill (Class 1) or structure backfill (Class 2) to backfill culverts and sewer pipes.

Flow-Fill is a self-leveling low strength concrete material composed of cement, fly ash, aggregates, water, chemical admixtures and/or cellular foam for air-entrainment. Flow-fill shall have a slump of 7 to 10 inches, when tested in accordance with ASTM C143 or a minimum flow consistency of 6 inches when tested in accordance with ASTM D6103. Flow-Fill shall have a minimum compressive strength of 50 psi at 28 days, when tested in accordance with ASTM D4832. Flash Fill shall not be used in lieu of Flow Fill.

Flow-Fill placed in areas that require future excavation, such as utility backfill shall have a Removability Modulus (RM) of 1.5 or less.

Removability Modulus, RM, is calculated as follows:

$$RM = \frac{W^{1.5} \times 104 \times C^{0.5}}{10^6}$$

where : W = unit weight (pcf)
C = 28-day compressive strength (psi)

Materials for structure backfill (Flow-Fill) shall meet the requirements specified in the following subsections:

| | |
|---|---|
| Fine Aggregate[1, 4] | 703.01 |
| Coarse Aggregate[2, 4] | 703.02 |
| Portland Cement | 701.01 |
| Fly Ash[3, 4] | 701.02 |
| Water | 712.01 |
| Air Entraining Admixture | 711.02 |
| Chemical Admixtures | 711.03 |

[1] Fine aggregate not meeting the requirements of subsection 703.01 may be used if testing indicates acceptable results for strength and air content.
[2] Coarse aggregate not meeting the requirements of subsection 703.02 may be used if testing indicates acceptable results for strength and air content.
[3] Fly ash not meeting the requirements of subsection 701.02 may be used if testing indicates acceptable results for strength and air content.
[4] Industrial by-product aggregates (foundry sand, bottom ash, etc..) and fly ash not meeting the requirements of subsection 701.02 shall submit a report from the supplier documenting the results of testing in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) described in 40 CFR 261. The report shall include the results of TCLP testing for heavy metals and other contaminants. Materials shall not exceed the TCLP limits of 40 CFR 261.24 for heavy metals

Cellular foam shall conform to ASTM C869 and ASTM C796

Recycled broken glass (glass cullet) is acceptable as part or all of the aggregate. Aggregate including glass must conform to the required gradations. All containers used to produce the cullet shall be empty prior to processing. Chemical, pharmaceutical, insecticide, pesticide, or other glass containers containing or having contained toxic or hazardous substances shall not be allowed and shall be grounds for rejecting the glass cullet. The maximum debris level in the cullet shall be 10 percent. Debris is defined as any deleterious material which impacts the performance of the structure backfill (Flow-Fill) including all non-glass constituents.

The Contractor may use aggregate which does not meet the above specifications if the aggregate conforms to the following gradation:

| **Sieve Size** | **Percent Passing** |
|---|---|
| 25.0 mm (1 inch) | 100 |
| 75 µm (No. 200) | 0-10[1] |

[1] The amount of material passing the 75 µm (No. 200) screen may exceed 10 percent if testing indicates acceptable results for strength and air content.

The Contractor shall submit a structure backfill (Flow-Fill) mix design for approval prior to placement. The mix design shall include the following laboratory test data:

(1) ASTM C231, Air content
(2) ASTM D6023, Unit Weight
(3) ASTM C143, Slump or ASTM D6103 flow consistency
(4) ASTM D4832 28-day Compressive Strength
(5) Removability Modulus (RM)

In subsection 206.03, delete the thirteenth through fifteenth paragraphs and replace with the following:

Compaction of structure backfill (Flow-Fill) shall not be performed.

The maximum layer thickness for structure backfill (Flow-Fill) shall be 3 feet unless otherwise approved by the Engineer. The Contractor shall not place structure backfill (Flow-Fill) in layers that are too thick to cause damage to culverts, pipes and other structures, or that will cause formwork or soil failures during placement. Structure backfill (Flow-Fill) shall have an indention diameter less than 3 inches and the indention shall be free of visible water when tested in accordance with ASTM D6024 by the Contractor prior to placing additional layers of structure backfill (Flow-Fill).Testing structure backfill (Flow-Fill) in accordance with ASTM D6024 will be witnessed by the Engineer. Damage resulting from placing structure backfill (Flow-Fill) in layers that are too thick or from not allowing sufficient time between placements of layers shall be repaired at the Contractor's expense.

The Contractor shall secure culverts, pipes and other structures to prevent floating and displacement of these items during the placement of the structure backfill (Flow-Fill).

Prior to the placement of structure backfill (Flow-Fill), the Contractor shall sample the structure backfill (Flow-Fill) in accordance with ASTM D5971. The Contractor shall test the structure backfill (Flow-Fill) unit weight in accordance with ASTM D6023. The Contractor shall test the structure backfill (Flow-Fill) for slump in accordance with ASTM C143 or flow consistency according to ASTM D6103.

The Contractor shall sample and test the first three loads of structure backfill (Flow-Fill) for each placement and then randomly once every 50 cubic yards. Sampling and testing will be witnessed by the Engineer

When structure backfill (Flow-Fill) is placed in areas that require future excavation, the unit weight of the placed structure backfill (Flow-Fill) shall not exceed the unit weight of the approved mix design by more than 2.0 pcf.

Structure backfill (Flow-Fill) shall not be allowed to freeze during placement and until it has set sufficiently according to ASTM D6024. Frozen structure backfill (Flow-Fill) shall be removed and replaced at the Contractor's expense.

When the Contractor substitutes Structure Backfill (Flow-Fill) for Structure Backfill (Class 1) or (Class 2), the trench width may be reduced to provide a minimum 6 inch clearance between the outside diameter of the culvert and the trench wall.

**REVISION OF SECTION 206**
**STRUCTURE BACKFILL AT BRIDGE ABUTMENTS**

Section 206 of the Standard Specifications is hereby revised for this project as follows:

In subsection 206.02 (a), delete the first sentence of the second paragraph and replace with the following:

Structure backfill (Class 1) with mechanical reinforcement shall be used to backfill bridge abutments, unless otherwise shown on the Plans. When structure backfill (flow-fill) is called for, it shall meet the following requirements.

**REVISION OF SECTIONS 206 AND 601**
**BACKFILLING STRUCTURES THAT SUPPORT LATERAL EARTH PRESSURES**

Sections 206 and 601 of the Standard Specifications are hereby revised for this project as follows:

In subsection 206.03, delete the ninth paragraph and replace with the following:

Backfill material shall not be deposited against newly constructed masonry or concrete structures, until the concrete has developed a compressive strength of 0.8 f 'c, except in cases where the structures support lateral earth pressure. Concrete compressive strength for structures supporting lateral earth pressure shall conform to subsection 601.12 (o).

Subsection 601.12 shall include the following:

(o) *Backfilling Structures that Support Lateral Earth Pressure.* Concrete compressive strengths shall reach f'c before backfilling operations can begin with heavy equipment, such as skid-steers or self-powered riding compactors. Concrete compressive strengths shall reach 0.8 f'c before backfilling operations can begin with hand operated equipment.

**REVISION OF SECTION 212**
**SEED**

Section 212 of the Standard Specifications is hereby revised for this project as follows:

In subsection 212.02 (a), delete the first paragraph and replace with the following:

(a) *Seed.* All seed shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the seed name, the lot number, net weight, origin, the percent of weed seed content, the guaranteed percentage of purity and germination, pounds of pure live seed (PLS) of each seed species, and the total pounds of PLS in the container. All seeds shall be free from noxious weed seeds in accordance with current state and local lists and as indicated in Section 213. The Contractor shall furnish to the Engineer a signed statement certifying that the seed is from a lot that has been tested by a recognized laboratory for seed testing within thirteen months prior to the date of seeding. The Engineer may obtain seed samples from the seed equipment, furnished bags or containers to test seed for species identification, purity and germination. Seed tested and found to be less than 10 percent of the labeled certified PLS and different than the specified species will not be accepted. Seed which has become wet, moldy, or damaged in transit or in storage will not be accepted.

**REVISION OF SECTION 213**
**MULCHING**

Section 213 of the Standard Specifications is hereby revised for this project as follows:

In subsection 213.01, delete the last paragraph and replace with the following:

This work includes furnishing and applying spray-on mulch blanket or bonded fiber matrix on top of rock cuts and slopes after seeding or as temporary stabilization as shown on the plans or as directed by the Engineer.

In subsection 213.02, delete the eighth paragraph and replace with the following:

The hydromulch material for hydraulic mulching shall consist of virgin wood fibers manufactured expressly from clean whole wood chips. The chips shall be processed in such a manner as to contain no growth or germination inhibiting factors. Fiber shall not be produced from recycled materials such as sawdust, paper, cardboard, or residue from pulp and paper plants. The wood cellulose fibers of the mulch must maintain uniform suspension in water under agitation. Upon application, the mulch material shall form a blotter like mat covering the ground. This mat shall have the characteristics of moisture absorption and percolation and shall cover and hold seed in contact with the soil. The Contractor shall obtain certifications from suppliers that laboratory and field testing of their product has been accomplished, and that it meets all of the foregoing requirements pertaining to wood cellulose fiber mulch.

In subsection 213.02, delete the eleventh paragraph and replace with the following:

Material for mulch tackifier shall consist of a free-flowing, noncorrosive powder produced either from the natural plant gum of Plantago Insularis (Desert Indianwheat) or pre-gelatinized 100 percent natural corn starch polymer. The powders shall possess the following properties:

Plantago Insularis (Desert Indianwheat):

| Property | Requirement | Test Method |
|---|---|---|
| (1) pH 1% solution | 6.5 - 8.0 | |
| (2) Mucilage content | 75% min. | ASTM D7047 |

Pre-gelatinized 100 percent natural corn starch polymer:

| | | |
|---|---|---|
| (1) | Organic Nitrogen as protein | 5.5-7% |
| (2) | Ash content | 0-2% |
| (3) | Fiber | 4-5% |
| (4) | pH 1% solution | 6.5 – 8.0 |
| (5) | Size | 100% thru 850 microns (20 mesh) |
| (6) | Settleable solids | <2% |

All fibers shall be colored green or yellow with a biodegradable dye.

Delete the last paragraph in subsection 213.02 and replace with the following:

(a) *Spray-on Mulch Blanket.* Spray on mulch blanket shall be one of the following, unless otherwise shown on the plans:

(1) Spray-on Mulch Blanket (Type 1) shall be a hydraulically applied matrix containing organic fibers, water soluble cross-linked tackifier, reinforcing natural and/or synthetic interlocking fibers. Mulch Blanket (Type 1) shall conform to the following:

| Properties | Requirement | Test Method |
|---|---|---|

| | | |
|---|---|---|
| Organic Fibers | 71% Min. | ASTM D 2974 |
| Cross linked Tackifiers | 10% +/- 2% Min. | |
| Reinforcing Interlocking Fibers | 10% +/- 1% Min. | |
| Biodegradability | 100% | ASTM D 5338 |
| Ground Cover @ Application Rate | 90% Min. | ASTM D 6567 |
| Functional Longevity | 12 Months Min. | |
| Cure Time | < 8 hours | |
| **Application** | | |
| Application Rate | 3,000 lb./acre | |

The organic fiber shall not contain lead paint, printing ink, varnish, petroleum products, seed germination inhibitors, or chlorine bleach. The organic fibers and reinforcing interlocking fibers cannot be produced from sawdust, cardboard, paper, or paper by-products.

(2) Spray-on Mulch Blanket (Type 2) shall be a hydraulically applied matrix pre-packaged in 50 pound bags containing both a soil and fiber stabilizing compound and thermally processed wood fiber.

The sterilized weed-free wood fiber mulch shall be manufactured through a thermo-mechanical defibrating process containing a specific range of fiber lengths averaging 0.25 inches or longer.

Mulch Blanket (Type 2) shall meet the following requirements:

| Property | Requirement | Test Method |
|---|---|---|
| Fiber Retention On 28-Mesh Screen | ≥ 40% | Tyler Ro-Tap Method |
| Moisture Content | 12% ± 2% | Total Air Dry Weight Basis |
| Organic Matter | 99.2% ± 0.2% | Oven Dry Weight Basis |
| Ash Content | 0.8% ± 0.2% | Oven Dry Weight Basis |
| pH At 3% Consistency In Water | 4.5-7.0 ± 0.5% | |
| Sterilized Weed-Free | Yes | |
| Non-Toxic To Plant Or Animal Life | Yes | |

The soil and fiber stabilizing compound shall be composed of linear anionic copolymers of acrylamide pre-packed within the bag having a minimum content of 1.0 percent. The compound shall conform to the following:

| Property | Requirement |
|---|---|
| Molecular Weight | ≥ 12x106 |
| Charge Density | > 25% |
| Non-Toxic To Plant Or Animal Life | Yes |

(b) *Bonded Fiber Matrices (BFM).* BFM shall consist of hydraulically-applied matrix with a minimum of 70 percent non-toxic thermally processed or refined long strand organic fibers and water soluble tackifier to provide erosion control and designed to be functional for a minimum of 9 months. BFMs form an erosion-resistant blanket that promotes vegetation and prevents soil erosion. The BFM shall be 100 percent biodegradable. The binder in the BFM should also be biodegradable. Biodegradable BFMs should not be applied immediately before, during, or immediately after rainfall if the soil is saturated. BFM shall conform to the following requirements:

| Property | Requirement | Test Method |
|---|---|---|

| | | |
|---|---|---|
| Ground Cover (%) | 95 | ASTM 6567 |
| Bio-degradability (%) | 100 | ASTM 5338 |
| Functional Longevity (months) | 9 month minimum | |
| Cure Time (hours) | 24-48 | |
| Cross-linked tackifier | 10% minimum | |

**Application**

| | |
|---|---|
| Application Rate (lbs./Acre) | 3000 |

The fibers shall not contain lead paint, printing ink, varnish, petroleum products, seed germination inhibitors, or chlorine bleach. Fiber shall not be produced from sawdust, cardboard, paper, or paper by-products.

In subsection 213.03 (b) 2, delete the second paragraph and replace with the following:

Application Rate: Apply this as an overspray at the following rate or as approved by the Engineer.

| **Powder** | **Fiber** | **Water** |
|---|---|---|
| 200 lbs./Acre | 300 lbs./Acre | 2000 gal./Acre |

In subsection 213.03, delete (f) and replace with the following:

(f) *Spray-on Mulch Blanket.* Spray-on Mulch Blanket shall strictly comply with the Manufacturer's mixing recommendations and installation instructions. No chemical additives with the exception of fertilizer, soil pH modifiers, extended-term dyes and bio nutrients will be permitted. Apply Spray-on mulch blanket in a uniform application using a minimum 22 degree arc type nozzle. Apply hydro slurry in two direction (from top of slope down and from toe of the slope up, as well as, be applied at a minimum of two layers).

Hydromulching vessel shall be filled with water to at least 1/3 capacity (high enough to cover agitators) prior to adding any material. Continue to fill vessel with water and slowly add the fibers while agitators are in motion. Run agitators at ¾ speed. Continue to mix tank a minimum of 10 minutes prior to application.

Co-polymer shall not be used use in channels, swales, or other areas where concentrated flows are anticipated and should not be used on saturated soils that have groundwater seeps.

Subsection 213.03 shall include the following:

(g) *Bonded Fiber Matrices (BFM).* Bonded fiber matrices shall strictly comply with the Manufacturer's mixing recommendations and installation instructions. No chemical additives with the exception of fertilizer, soil pH modifiers, extended-term dyes and bio stimulant materials shall be permitted. BFM shall be applied in a uniform application using a minimum 22 degree arc type nozzle. Apply BFM in two direction (from top of slope down and from toe of the slope up, as well as, be applied at a minimum of two layers.

Biodegradable BFMs should not be applied immediately before, during, or immediately after rainfall if the soil is saturated.

Product shall not be used use in channels, swales, or other areas where concentrated flows are anticipated and should not be used on saturated soils that have groundwater seeps.

Foot traffic, mechanical traffic or grazing shall not be permitted on treated areas until vegetated. Treated areas damaged due to circumstances beyond Contractor's control shall be repaired or re-applied as ordered. Payment for corrective work, when ordered, shall be at contract rates.

In subsection 213.04, delete the first paragraph and replace with the following:

The quantity of hay and straw mulch, wood chip mulch, wood fiber and, spray-on mulch tackifier, bonded fiber matrix and tackifier will not be measured but shall be the quantity designated in the Contract, except that measurements will be made for revisions requested by the Engineer, or for discrepancies of plus or minus five percent of the total quantity designated in the Contract. Measurement for acres will be by slope distances.

In subsection 213.04, delete the fourth paragraph and replace with the following:

Spray-on Mulch Blanket and Bonded Fiber Matrix will be measured by the acre or by the actual pounds of product applied, as shown on the plans. The area will be calculated on the basis of actual or computed slope measurements. The Contractor shall verify prior to application, weight of spray on mulch blanket and bonded fiber matrix bags for certification of materials and application rate.

Subsection 213.05 shall include the following:

Payment will be made under:

| **Pay Item** | **Pay Unit** |
|---|---|
| Bonded Fiber Matrix | Acre |
| Bonded Fiber Matrix | Pound |
| Spray on Mulch Blanket | Pound |

Payment for spray-on mulch blanket and bonded fiber matrix will be full compensation for all work and materials necessary to complete this item.

## REVISION OF SECTION 216
## SOIL RETENTION COVERING

Section 216 of the Standard Specifications is hereby deleted for this project and replaced with the following:

### DESCRIPTION

**216.01** This work consists of furnishing, preparing, applying, placing, and securing soil retention blankets and turf reinforcement mats for erosion control on roadway slopes or channels as designated in the Contract.

### MATERIALS

**216.02** Soil retention covering shall be either a soil retention blanket or a turf reinforcement mat as specified in the Contract. It shall be one of the products listed on CDOT's Approved Products List and shall conform to the following:

(a) *Soil Retention Blanket.* Soil retention blanket shall be composed of degradable natural fibers mechanically bound together between two slowly degrading synthetic or natural fiber nettings to form a continuous matrix and shall conform to the requirements of Tables 216-1 and 216-2. The blanket shall be of consistent thickness with the fiber evenly distributed over the entire area of the mat.

When specified lightweight polypropylene netting shall be 1.5 pounds per 1000 square feet; heavyweight netting shall be 2.9 pounds per 1000 square feet.

When biodegradable blanket is specified, the thread shall be 100 percent biodegradable; polypropylene thread is not allowed.

When photodegradable netting is specified the thread shall be polyester, biodegradable or photodegradable.

Blankets and nettings shall be non-toxic to vegetation and shall not inhibit germination of native seed mix as specified in the Contract. The materials shall not be toxic or injurious to humans. Class 1 blanket shall be an extended term blanket with a typical 24 month functional longevity. Class 2 blanket shall be a long term blanket with a typical 36 month functional longevity. The class of blanket is defined by the physical and performance characteristics.

1. *Soil Retention Blanket (Straw-Coconut).* Soil Retention Blanket (Straw-Coconut) shall be a machine produced mat consisting of 70 percent certified weed free agricultural straw or Colorado native grass straw and 30 percent coconut fiber. The blanket shall be either biodegradable or photodegradable. Blankets shall be sewn together on a maximum 2 inch centers.

   Netting shall be as follows:

   When biodegradable netting is specified, the top and bottom netting shall be 100 percent biodegradable organic jute fiber. Netting shall be constructed using a weave unattached at intersections which allows the strands of the net to move independently of each other.

   When photodegradable netting is specified, the bottom side shall be lightweight polypropylene. The top side shall be heavyweight or lightweight polypropylene.

2. *Soil Retention Blanket* (*Excelsior).* Soil Retention Blanket (Excelsior) blanket shall consist of a machine produced mat of 100 percent curled wood excelsior , 80 percent of which shall be 6 inches or longer in fiber length. It shall be either biodegradable or photodegradable. Blankets shall be sewn together at a maximum of 4 inch centers.

   Netting shall be as follows:

   When biodegradable netting is specified, the top and bottom netting shall be 100 percent biodegradable organic jute fiber. Netting shall be constructed using a weave unattached at intersections which allows the strands of the net to move independently of each other.

When photodegradable netting is specified, the bottom side shall be lightweight polypropylene. The top side shall be heavyweight or lightweight polypropylene.

3. *Soil Retention Blanket (Coconut)*. Soil Retention Blanket (Coconut) shall be a machine produced mat consisting of 100 percent coconut fiber. It shall be either biodegradable or photodegradable.

   Netting shall be as follows:

   When biodegradable netting is specified, the top and bottom netting shall be 100 percent biodegradable organic jute fiber. Netting shall be constructed using a weave which is unattached at the intersections, and which allows the strands of the net to move independently of each other.

   When photodegradable netting is specified, the bottom and top side shall be heavyweight polypropylene.

**Table 216-1**
**PHYSICAL REQUIREMENTS FOR SOIL RETENTION BLANKET – PHOTODEGRADABLE OR BIODEGRADABLE BLANKETS**

| Photo/Bio Degradable Class | Minimum Roll Width | Minimum Thickness ASTM D 6525 | Acceptable Matrix Fill Material | Min. Mass per Unit Area ASTM D 6475 | Size of Net Opening | |
|---|---|---|---|---|---|---|
| | | | | | Photo-degradable | Bio-degradable |
| 1 | 6.5 ft. | 250 mils | Straw/Coconut | 8 oz/sy | Minimum: 0.50"x0.50" / Maximum: 0.75"x0.75" | Minimum: 0.50"x0.50" / Maximum: 0.5"x1.0" |
| 1 | 6.5 ft. | 250 mils | Excelsior | 8 oz/sy | Minimum: 0.50"x0.50" / Maximum: 1.0"x2.0" | NONE |
| 2 | 6.5 ft. | 200 mils | Coconut | 8oz/sy | Minimum: 0.50" x0.5" / Maximum: 0.75"x0.75" | Minimum: 0.50"x0.50" / Maximum: 0.5"x1.0" |

**Table 216-2**
**PERFORMANCE REQUIREMENTS FOR SOIL RETENTION BLANKET – PHOTODEGRADABLE OR BIODEGRADABLE BLANKETS**

| Photo/Bio Degradable Class | Slope Application "C" Factor[1] ASTM D 6459 | Minimum Tensile Strength MD[2] ASTM D 6818 |
|---|---|---|
| 1 | ≤ 0.10@3:1 | 8.33 lb/in |
| 2 | ≤ 0.10@3:1 | 10.42 lb/in |

**Notes:**

[1] "C" Factor calculated as ratio of soil loss from soil retention blanket protected slope (tested at specified or greater gradient, 3H:1V) to ratio of soil loss from unprotected (control) plot in large-scale testing.

[2] MD is for machine direction testing (along the length of the roll).

Blankets shall be tested for physical properties and have published data from an independent testing facility.

Large scale testing of Slope Erosion Protection ("C" factor) shall be performed by an independent testing facility.

(b) *Turf Reinforcement Mat.* Turf reinforcement mat (TRM) shall be a rolled mat consisting of UV stabilized, corrosion resistant, non-degradable synthetic fibers, filaments, or nets processed into a permanent three-dimensional matrix of the thickness specified in Tables 216-3 and 216-4. TRMs shall provide sufficient thickness, strength and void space to permit soil filling and retention, and the development of vegetation within the matrix. The class of TRM is defined by the physical and performance characteristics as specified in the following tables.

**Table 216-3**
**PHYSICAL REQUIREMENTS[1] FOR TURF REINFORCEMENT MAT**

| Product Class | Minimum Roll Width | Minimum Thickness ASTM D 6525 | Acceptable Matrix Fill Material[2] | Size of Net Opening[2] |
|---|---|---|---|---|
| 1 | 6.5 ft. | 250 mils | Excelsior, Straw/Coconut, Coconut, or Polymer fibers | Minimum: 0.50"x0.50" / Maximum: 0.75"x0.75" |
| 2 | 6.5 ft. | 250 mils | 100% UV Stabilized Synthetic or Coconut Fibers | Maximum 0.50"x 0.50" |
| 3 | 6.5 ft. | 250 mils | 100% UV Stabilized Synthetic Fibers | Maximum 0.50"x 0.50" |

**Notes:**

1 For TRMs containing degradable components, all property values shall be obtained on the non-degradable portion of the matting alone.

2 For TRMs with nets and fill material. Netted TRMs shall be sewn together on a maximum 2 inch centers.

**Table 216-4**
**PERFORMANCE REQUIREMENTS FOR TURF REINFORCEMENT MAT**

| Product Class | Tensile Strength MD ASTM D 6818 | Minimum UV Stability @ 500 Hours ASTM D 4355 | Minimum Permissible Shear Stress[1] (Unvegetated) ASTM D 6460 |
|---|---|---|---|
| 1 | 125 lbs/ft | 80% | 1.8 lbs/sf |
| 2 | 150 lbs/ft | 80% | 2.5 lbs/sf |
| 3 | 175 lbs/ft | 80% | 3.1 lbs/sf |

**Notes:**

[1] Permissible shear stress is the minimum shear stress that a product must be able to sustain when placed on a channel un-vegetated without physical damage or excess soil loss. Failure is defined as ½ inch of soil loss during a 30 minute flow event in large scale testing.

TRMs shall be tested for physical properties and have published data from an independent testing facility.

Large scale testing of Permissible Shear Stress will be performed by an independent testing facility.

(c) *Staples.* Staples shall be made of ductile steel wire, 0.165 inches in diameter, 8 inches long and have a 1 inch crown. "T" shaped staples will not be permitted.

A sample of the staples and a Certificate of Compliance (COC) including the manufacturer's product data showing that the product meets the Contract requirements shall be submitted for approval at the environmental preconstruction conference. Installation of the blanket will not begin until approval has been received from the Engineer in writing.

(d) *Earth Anchors*. The mechanical earth anchor shall be composed of a load bearing face plate, a tendon rod or wire rope, and a locking head or percussion anchor. Each element of the anchor shall be composed of corrosion resistant materials. The anchor and wire rope shall have a breaking strength of 9,500 pounds utilizing standard tensile testing and ASTM A1007 - 07. The anchor shall have a minimum 1,000 pounds ultimate holding strength in normal soil and a manufacturer's recommended minimum driven depth of 3.5 feet.

A sample of the anchors and a Certificate of Compliance (COC) including the manufacturer's product data showing that the product meets the Contract requirements shall be submitted for approval at the environmental preconstruction conference. Installation of the blanket will not begin until approval has been received from the Engineer in writing.

**CONSTRUCTION REQUIREMENTS**

**216.03** The Contractor shall install soil retention coverings in accordance with Standard Plan M-216-1 and the following procedure:

(1) Prepare soil in accordance with subsection 212.06 (a). .
(2) Apply topsoil or soil conditioning as directed in the Contract to prepare seed bed.
(3) Place seed in accordance with the Contract.
(4) Unroll the covering parallel to the primary direction of flow.
(5) Ensure that the covering maintains direct contact with the soil surface over the entirety of the installation area.
(6) Do not stretch the material or allow it to bridge over surface inconsistencies.
(7) Staple the covering to the soil such that each staple is flush with the underlying soil.
(8) Ensure that staples or earth anchors are installed full depth to resist pull out. No bent over staples will be allowed. Install anchor trenches, seams, and terminal ends as shown on the plans.

The Contractor shall install TRMs using the following procedure:

(1) Place 3 inches of topsoil or soil amended with soil conditioning.
(2) Apply half of the specified seed at the broadcast rate and rake into soil.
(3) Install TRM
(4) Place 1 inch of topsoil or soil amended with soil conditioning into the matrix to fill the product thickness.
(5) Apply the remaining half of the specified seed at the broadcast rate and rake into soil.
(6) Install soil retention blanket (Photodegradable or Biodegradable Class 1) over the seeded area and TRM.

When applicable, the covering shall be unrolled with the heavyweight polypropylene netting on top and the lightweight polypropylene netting shall be in contact with the soil.

**216.04 Slope Application**. Soil retention coverings shall be installed on slopes as follows:

The upslope end shall be buried in a trench 3 feet beyond the crest of the slope if possible. Trench depth shall be a minimum of 6 inches unless required by the manufacture to be deeper. Before backfilling begins, staples shall be placed across the width of the trench. The trench shall then be backfilled to grade with soil amended with soil conditioning or topsoil, compacted by foot tamping, and seeded. Fabric shall be brought back over trench and secured with staples or earth anchors at 1 foot on center.

There shall be an overlap wherever one roll of fabric ends and another begins with the uphill covering placed on top of the downhill covering. Staples shall be installed in the overlap.

There shall be an overlap wherever two widths of covering are applied side by side. Staples shall be installed in the overlap.

Staple checks shall be installed on the slope length at a maximum of every 35 feet. Each staple check shall consist of two rows of staggered staples.

The down slope end shall be buried in a trench 3 feet beyond the toe of slope. Before backfilling begins, staples shall be placed across the width of the trench. The trench shall then be backfilled to grade with soil amended with soil conditioning or topsoil, compacted by foot tamping, and seeded. Fabric shall be brought back over trench and secured with staples or earth anchors. If a slope runs into State waters or cannot be extended 3 feet beyond the toe of slope, the end of covering shall be secured using a staple check as described above.

Coverings shall be securely fastened to the soil by installing staples or earth anchors at the minimum rate shown on the Standard Plan M-216-1. Staple or earth anchor spacing shall be reduced where required due to soil type or steepness of slope.

**216.05 Channel Application**. Soil retention coverings shall be installed as follows on a channel application:

Coverings shall be anchored at the beginning and end of the channel across its entire width by burying the end in a trench. Trench depth shall be a minimum of 6 inches, unless a larger depth is specified by the manufacturer recommendations. Before backfilling begins, staples shall be placed across the width of the trench. The trench shall then be backfilled to grade with soil amended with soil conditioning or topsoil and compacted by foot tamping, and seeded. Fabric shall be brought back over the trench and stapled.

Covering shall be unrolled in the direction of flow and placed in the bottom of the channel first. Seams shall not be placed down the center of the channel bottom or in areas of concentrated flows when placing rolls side by side.

There shall be an overlap wherever one roll of covering ends and another begins with the upstream covering placed on top of the downstream covering. Two rows of staggered staples shall be placed.

There shall be an overlap wherever two widths of covering are applied side by side. Staples shall be placed in the overlap.

The covering shall have a channel check slot every 30 feet along the gradient of the flowline. Check slots shall extend the entire width of the channel. The covering shall be buried in a trench. Before backfilling begins, staples shall be placed across the width of the trench. The trench shall then be backfilled to grade with soil amended with soil conditioning or topsoil, compacted by foot tamping, and seeded. Fabric shall be brought back over trench and continued down the channel.

Coverings shall be securely fastened to the soil by installing staples at the minimum rate shown on the plans. Staple spacing shall be reduced where needed due to soil type or high flows.

**216.06 Maintenance***.* The Contractor shall maintain the soil retention coverings until all work on the Contract has been completed and accepted. Maintenance shall consist of the repair of areas where damage is due to the Contractor's operations. Maintenance shall be performed at the Contractor's expense. Repair of those areas damaged by causes not attributable to the Contractor's operations shall be repaired by the Contractor and will be paid for at the contract unit price. Areas shall be repaired to reestablish the condition and grade of the soil and seeding prior to application of the covering.

## METHOD OF MEASUREMENT

**216.07** Soil retention coverings, including staples, complete in place and accepted, will be measured by the square yard of finished surface, excluding overlap, which is installed and accepted. Earth Anchors will be measured by the actual number of earth anchors complete in place and accepted.

## BASIS OF PAYMENT

**216.08** The accepted quantities of soil retention coverings will be paid for at the contract unit price per square yard. The accepted quantities of earth anchors will be paid for at the contract unit price per each installed.

Payment will be made under:

| **Pay Item** | **Pay Unit** |
|---|---|
| Soil Retention Blanket (_) (Photodegradable Class _) | Square Yard |
| Soil Retention Blanket ( ) (Biodegradable Class _) | Square Yard |
| Turf Reinforcement Mat (Class _) | Square Yard |
| Earth Anchors | Each |

Preparation of seedbed, fertilizing, and seeding will be measured and paid for in accordance with Section 212.

Placing and preparation of seedbed, fertilizing, and seeding of soil under the TRM layer will be measured and paid for in accordance with Section 212.

Topsoil or amended soil and seed placed on the TRM will be measured and paid for in accordance with Sections 207 and 212.

Staples will not be measured and paid for separately, but shall be included in the work.

**REVISION OF SECTION 250**
**ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT**

Section 250 of the Standard Specifications is hereby deleted for this projected and replaced with the following:

## DESCRIPTION

**250.01** This work consists of protection of the environment, persons, and property from contaminants that may be encountered on the Project. This includes monitoring the work for encounters with contaminants or suspected soil and groundwater contaminants; the management of solid, special, and hazardous waste; and management of visual emissions associated with hazardous waste, when encountered on the project.

**250.02** The Contractor shall furnish all personnel, materials, equipment, laboratory services and traffic control necessary to perform the contamination monitoring, testing, and site remediation when required. Traffic control shall be in accordance with the requirements of Section 630.

Monitoring equipment used to detect flammable gas, oxygen level, and toxic gas shall be capable of detection to meet the following standards:

| Instrument Detection | | |
|---|---|---|
| **Constituent** | **Threshold Limit** | **Increments** |
| Flammable Gas | 1% LEL | 1% |
| Oxygen | 19% | 0.1% |
| Toxic Gas | 1 PPM | 1 PPM |
| LEL = lower explosive limit<br>PPM = parts per million | | |

## CONSTRUCTION REQUIREMENTS

**250.03 General**. Prospective bidders, including subcontractors, are required to review the environmental documents available for this project. These documents are listed in subsection 102.05 as revised for this project.

This project may be in the vicinity of property associated with petroleum products, heavy metal based paint, landfill, buried foundations, abandoned utility lines, industrial area or other sites which can yield hazardous substances or produce dangerous gases. These hazardous substances or gases can migrate within or into the construction area and could create hazardous conditions. The Contractor shall use appropriate methods to reduce and control known landfill, industrial gases, and visible emissions from asbestos encounters and hazardous substances which exist or migrate into the construction area. The Contractor shall follow CDOT's *Asbestos-Contaminated Soil Management Standard Operating Procedure, dated August 22, 2011* for proper handling of asbestos-contaminated soil, and follow all applicable Solid and Hazardous Waste Regulations for proper handling of soils encountered that contain any other substance mentioned above.

Encountering suspected contaminated material, including groundwater, old foundations, building materials, demolition debris, or utility lines that may contain asbestos or be contaminated by asbestos, is possible at some point during the construction of this project. When suspected contaminated material, including groundwater, is encountered or brought to the surface, the procedures under subsection 250.03(d) and 250.05 shall be followed.

Transportation of waste materials on public highways, streets and roadways shall be done in accordance with Title 49, Code of Federal Regulations (CFR). All labeling, manifesting, transportation, etc. of waste materials generated on this project shall be coordinated with the

Engineer. All hazardous waste manifests for waste materials generated on this project shall list the Colorado Department of Transportation as the generator of the waste materials except as otherwise noted. If the Contractor contaminates the site, the Contractor shall be listed as the generator on the hazardous waste manifests, permits, and other documents for such material. If the project is not on a State Highway or frontage road, then the appropriate local governmental entity having jurisdiction over the transportation system facility shall be listed as the hazardous waste generator.

If waste materials must be handled in a permitted treatment, storage and disposal (TSD) facility, the facility shall be designated in writing by the Engineer. If the waste materials are the result of the Contractor's actions, the Contractor shall designate the facility.

The hazardous waste transportation phase of the work involves insurance required by law and regulations. If the waste materials are determined to be hazardous, the Contractor must submit proof that the transportation company is covered by the appropriate type and amount of insurance required by laws and regulations governing the transportation of hazardous waste.

The Contractor alone bears the responsibility for determining that the work is accomplished in strict accordance with all applicable federal, state and local laws, regulations, standards, and codes governing special waste, petroleum and hazardous substance encounters and releases.

The Contract will list known or suspected areas of contamination. Health and Safety Officer, Monitoring Technician, and Health and Safety Plan shall be required when so stated in the Contract.

(a) *Health and Safety Officer (HSO).* The Contractor shall designate a HSO, not the project superintendent, who shall have at least two years field experience in chemical related health and safety. The HSO shall be either a certified industrial hygienist (CIH), certified hazardous materials manager (CHMM), professional engineer (PE) licensed in the State of Colorado, certified safety professional (CSP), or registered environmental manager (REM) meeting the criteria set forth in 29 CFR 1926. When asbestos is present or is suspected to be present, the HSO shall have additional training and certification in accordance with the Air Quality Control Commission Regulation No. 8 Part B. The HSO shall meet the minimum training and medical surveillance requirements established by the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) for a supervisory Site Safety Official per 29 CFR 1962.65. The Contractor shall furnish documentation to the Engineer, at the preconstruction conference, that the above requirements have been met. 250.03.

The HSO shall *be* equipped with the following:

(1) Communication equipment as required in subsection 250.03(d)2.A. and a vehicle.

(2) Monitoring and detection equipment for flammable gas, oxygen sufficiency, toxic gas, radiological screening and other hazards. This includes, as required, a combustible gas indicator, flame ionization or photo ionization detector, oxygen meter, radiation monitor with Geiger Mueller detector and other foreseeable equipment.

(3) Depth gauging equipment, sampling equipment and sampling containers.

(4) Personal protective equipment (levels C and D) when required.

The HSO shall recommend and supervise those actions which will minimize the risk of hazardous substance related injury to the workers, Department personnel, the general public, property and the environment. Hazardous substance is defined in 29 CFR 1926.32. The HSO shall prepare written procedures for the monitoring of confined space entry and working in or near excavations, including but not limited to trenches and drill holes associated with this project. The HSO shall conduct or supervise all hazardous substance and solid waste related testing, sampling, monitoring and handling for this project to ensure compliance with applicable statutes and regulations, and other applicable environmental requirements under subsections 107.01 and 107.02.

The HSO shall be available for consultation and assistance with contaminated materials related testing, sampling, and field monitoring as required by the Engineer.

The HSO shall prepare and submit a bound and indexed final site report to the Engineer at the end of the project. This site report shall include a detailed summary of all contaminated materials and contaminated water that were encountered and their final disposition.

During each week the HSO is utilized, the HSO shall prepare a daily diary which shall be submitted to the Contractor and the Engineer. This diary shall be submitted at the end of the week and shall become a part of the Department's records. The diary shall contain a chronological log of activities on the project including: dates and times on site, equipment used and calibrations, field monitoring results, visual observations, conversations, directives both given and received, and disposition of suspected hazardous substances. The Engineer will review this submittal and approve the actual number of hours to be paid.

(b) *Monitoring Technician (MT).* The Contractor shall designate a monitoring technician to be responsible for monitoring of hazardous substances during work on the project. The MT shall have a minimum of two years of actual field experience in assessment and remediation of hazardous substances that may be encountered during highway construction projects. The MT shall be experienced in the operation of monitoring devices, identifying substances based upon experience and observation, and field sampling (for testing) of all media that may be found on the site. Completion of the 40 hour hazardous waste and 8 hour supervisory training required by OSHA and U.S. EPA rules and regulations which complies with the accreditation criteria under the provisions of the proposed 29 CFR 1910.121 is required prior to beginning work. The Contractor shall furnish documentation at the Preconstruction Conference that demonstrates these requirements have been met.

The MT shall be equipped with the following:

(1) Communication equipment as required in subsection 250.03(d)2.A. and a vehicle.

(2) Monitoring and detection equipment for flammable gas, oxygen sufficiency, toxic gas, radiological screening and other hazards. This includes, as required, a combustible gas indicator, flame ionization or photo ionization detector, oxygen meter, radiation monitor with Geiger Mueller detector and other foreseeable equipment.

(3) Personal protective equipment (levels C and D) when required.

The MT shall be present on site and perform monitoring as required by 250.03(d) when work is being performed in areas of suspected contamination and on a predetermined basis throughout other work on the project.

The MT shall monitor for compliance with regulations, the project Health and Safety Plan and the Materials Management Plan (if they exist for the project), the Contract, and the environmental documents for the project. The MT shall immediately notify the Contractor, the Engineer and the HSO of any hazardous condition.

During each week the MT is utilized, the MT shall prepare a daily monitoring diary which shall be submitted to the Contractor, HSO and the Engineer. This diary shall be submitted at the end of the week and shall become a part of the Department's records. The diary shall contain a chronological log of activities on the project including: dates and times on site, equipment used and calibrations, field monitoring results, visual observations, conversations, directives both given and received, and disposition of suspected hazardous substances. The Engineer will review this submittal and approve the actual number of hours to be paid.

(c) *Health and Safety Plan (HASP).* The HSO shall prepare a written HASP for the project, formatted as shown in Appendix B, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, DHHS (NIOSH) Publication Number 85-115, available from the Superintendent of Documents, U.S. Government Printing Office. The Contractor and the

HSO shall review the environmental documents listed prior to preparation of the HASP.

Four signed copies of the HASP shall be furnished to the Engineer for acceptance. The Engineer shall have seven calendar days to review and accept or reject the proposed HASP. Within five calendar days after acceptance, the HSO shall distribute signed and stamped (or sealed) copies of the accepted HASP to each emergency response agency servicing the project area, the HASP designated emergency hospital, and five copies to the Engineer. Earth or demolition work shall not occur until after the HASP is accepted and the HASP has been distributed. The HASP shall also be available to the Contractor's employees, their representatives, and officials of OSHA, EPA, Colorado Department of Public Health and Environment (CDPHE), local government health department, Federal Highway Administration, and other appropriate agencies and officials as may be designated by the Engineer. The Engineer will distribute the accepted HASP to appropriate Department personnel. The HASP shall be kept current and shall be revised by the HSO as warranted by changes in the field conditions.

All on-site workers (Contractor's, Department's, Utilities', and others) shall be briefed by the HSO on the contents of the HASP and any revisions thereof. The HSO shall conduct briefings (group or individual) to inform new employees, subcontractors, utility companies and other on-site workers of the HASP contents prior to their entry on site. All personnel involved in excavation or other soil disturbing activities shall receive the required two-hour Asbestos Awareness training by a Certified Asbestos Inspector, when asbestos discoveries are anticipated, or discoveries are made. A signature log of all briefing attendees shall be kept and furnished to the Engineer. The Contractor shall provide, as required, eye wash equipment and stations, emergency showers, hand and face washing facilities and first aid equipment.

The Contractor shall provide, as required, decontamination facilities for personnel and equipment employed in the work. The exact procedure for decontamination and frequency shall be included in the accepted HASP. Decontamination facilities shall meet the criteria set forth in the Code of Federal Regulations (29 CFR and 40 CFR).

(d) *Precautions and Procedures.* The following minimum precautions and procedures shall be followed during the construction of the project:

1. General construction precautions:

   A. All monitoring and piezometer wells and test borings shall be established or abandoned by the Contractor as regulated by the State Engineer's Office. Copies of all required permits, notification, and abandonment documents shall be submitted to the Engineer prior to payment approval.

   B. Hazardous substance related activities shall have a work plan for each work phase which shall be coordinated with the Engineer at least three working days prior to commencement of each phase of the work.

   C. The Contractor shall properly handle all investigation derived waste generated by this project. Documentation shall be submitted to the Engineer of all tests performed for Treatment, Storage and Disposal (TSD) determination; classification of waste; hauling records; TSD acceptance; manifest (if required); etc. in accordance with applicable laws and regulations.

   D. When the work may involve air emissions, the Contractor shall contact the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division to ascertain if an air pollution emission notice (APEN) or permit is required for this operation. The Contractor shall be responsible for filing the APEN and obtaining said permit, if required. The processing of air pollution permits, if required, in non-attainment areas or where public hearings are required, likely will take more

than 90 days.

2. For construction on a known or potentially contaminated site, the following conditions shall apply, in addition to those listed in subsection 250.03(d)1:

   A. The HSO shall be on site or readily available by radio, telephone or pager at all times during the work. When on site, the HSO shall have an operational portable or mobile cellular telephone available for immediate use in areas where such service is available. When on site in cellular telephone non-service areas, the HSO shall have available, for immediate use, radio access to a site with telephone service. The HSO shall be notified at least 24 hours prior to the start of confined space entry, storage tank removal, drilling, excavation, trenching, or dewatering operations.

   B. The HSO shall designate the onsite monitoring equipment for flammable gases, oxygen deficient or enriched atmosphere, and toxic gases, such as but not limited to, a flame ionization detector, photoionization detector, combustible gas indicator, and oxygen meter. This designated equipment shall be on site during all construction operations and be utilized during trenching, drilling, excavating, confined space entry, underground storage tank removal, and other appropriate construction operations. The exact equipment to fulfill this requirement shall be specified in the accepted HASP. The HSO shall conduct or supervise the monitoring. The monitoring equipment shall be calibrated as recommended by the manufacturer.

   C. When drilling, trenching, or excavating in the presence of detectable concentrations of explosive gases, the soil shall be wetted and the operating equipment shall be provided with spark proof exhausts.

   D. The Contractor, through the HSO, is responsible for ensuring that 29 CFR 1926 is fully complied with during the construction of the project.

   E. Affected excavation operations shall be discontinued and personnel shall be removed from the affected excavation sites where any of the following levels are detected:

      (1) 20.0 percent or more LEL flammable gas, or 10.0 percent in an underground or confined space,

      (2) Permissible Exposure Limit (PEL) of any toxic gas,

      (3) 19.5 percent or less oxygen,

      (4) 25.0 percent or more oxygen,

      (5) Greater than 2 mrem/hr. (Beta particle & photon radioactivity),

      (6) Greater than 15 pCi/L (Gross alpha particle activity), or

      (7) Other action levels as determined by the HSO.

      (8) Uncovering of suspect Asbestos Containing Material (ACM), including but not limited to, buried facility components, active or abandoned utility lines, buried foundations and demolition debris, or miscellaneous ACM dispersed in the soil. The Contractor shall follow the procedures outlined in the HASP and 29 CFR 1926 to address these conditions. Work shall resume in these areas when approved by the Engineer.

   F. Personnel shall be issued and utilize appropriate Health and Safety equipment as determined by the HSO, who shall provide the Engineer with a written explanation of what personal protective equipment (PPE) shall be worn, when, and by which personnel. Except in emergency cases, the Engineer shall be advised by the HSO of changes in the degree of PPE prior to implementation.

   G. Personnel shall avoid the area immediately downwind of any excavation unless the excavation is monitored and declared safe.

   H. The operators of excavating, trenching, or drilling equipment shall wear appropriate PPE

as required in the HASP.

I. Exhaust blowers shall be present at the location where required in the accepted HASP.

J. The Contractor shall accomplish the work with employees who have been trained and equipped as required by the HASP and applicable provisions of 29 CFR 1910 and 29 CFR 1926.

K. Fire extinguishers, electrical equipment and wiring shall conform to the applicable requirements of 29 CFR 1926 and 49 CFR.

L. Smoking shall not be permitted within 50 feet of any excavation.

3. For construction within 1000 feet of a known or potentially contaminated site, the following conditions, in addition to those listed in subsection 250.03(d) 1. shall apply:

A. The areas under construction shall be checked with a combustible gas indicator before excavation begins to determine if flammable or combustible gas is in the area.

B. Excavations, trenches and drill holes shall be monitored by the HSO for flammable gas, toxic gas and oxygen deficiency or enrichment. This shall be carried out continuously unless the presence of flammable, combustible or toxic gas, or oxygen deficiency or enrichment in the area can be ruled out by the HSO. The recommendation to discontinue monitoring must be agreed to by the Engineer and the Contractor. Prior to implementation, this agreement shall be written, and shall contain specific conditions that will require re-evaluation of the area.

C. When flammable or toxic gas is found in the area, those precautions and procedures in subsection 250.03(d)2 shall apply.

4. The following procedures shall be followed if the level of contamination as documented in the environmental documents referenced in subsection 102.05 as revised for this project is exceeded, or if previously unidentified contaminated air, soil or water, is encountered during the construction of the project:

A. Work in the immediate area of the release or discovery of contamination shall cease. The Engineer shall be immediately notified.

B. If no HSO is required by the Contract, the Contractor shall designate an HSO as directed, in accordance with subsection 250.03(a).

C. The Engineer may direct the HSO to evaluate the material for potential hazardous substance or other contamination or unsafe conditions. This evaluation may include, but is not limited to, on site field monitoring, on site testing, and on or off site laboratory analysis. Removal of storage tanks and surrounding contaminated soils shall be in accordance with applicable laws, regulations and established procedures. If the contaminated material cannot be placed in the embankment or remediated on site, it must be removed to an appropriate TSD facility, as designated in writing by the Engineer. The HSO shall supervise the necessary testing required to make appropriate TSD determinations. Disposal of the unsuitable material shall be considered as remediation work as described in subsection 250.03(d)4.D and 250.03(d)4.E.

D. If this site is determined to be contaminated with petroleum products, hazardous substances or other solid waste in excess of that indicated in the above listed site investigation documents, a thorough Site Investigation and Waste Management Plan shall be accomplished under the supervision of the HSO The Site Investigation and Waste Management Plan shall be submitted to the Engineer for approval and shall determine the extent of contamination and propose at least three types of remedial action for the contaminated area as required by applicable statutes and regulations. The HSO shall be available to assist the Engineer in explaining this study to the regulatory

agencies. When requested by the Engineer, the Contractor shall prepare a Remediation Plan based on the selected remedial method, and shall submit this to the Engineer for approval. The time required for the Engineer's review of the Remediation Plan, including all necessary drawings, calculations, specifications, and other documentation will not exceed four weeks after a complete submittal is received. This work shall not be done unless authorized in writing by the Engineer.

E. If the site is determined to be contaminated with petroleum products; hazardous chemicals, materials, or wastes; or other solid wastes, and is required to be remediated, the HSO or other qualified individuals will supervise the Remediation Plan implementation as concurred to by the regulatory agencies, as directed. Hazardous Waste generated by remedial activities shall list the Colorado Department of Transportation as the hazardous waste generator on the required paperwork for projects on State Highways and their associated frontage roads. If this project is not on a State Highway or frontage road, then the appropriate local governmental entity having jurisdiction over the transportation system facility shall be listed as the hazardous waste generator. If the waste disturbed or produced was caused by Contractor negligence, the Contractor shall be listed as the hazardous waste generator. Remediation work shall be done only when authorized by the Engineer in writing.

**250.04 Heavy Metal Based Paint Management**. When the work includes the removal of paint or items covered with paint which may contain lead, chromium or other heavy metals, the requirements of this subsection shall apply in addition to the requirements of subsection 250.03.

The requirements of the HASP shall be in accordance with OSHA Publication Number 3142, *Working with Lead in the Construction Industry.*

Paint Removal and Waste Disposal work shall be performed in accordance with 29 CFR 1926.62, State and local air quality regulations, the Steel Structures Painting Council (SSPC) Guide for Containing Debris Generated During Paint Removal Operations, the *Industrial Lead Paint Removal Handbook* (SSPC 91-18), and the references contained therein.

The following minimum precautions and procedures shall be followed unless modified in the approved HASP or its updates:

(a) The Contractor shall contact the CDPHE, Air Pollution Control Division to ascertain if an air pollution permit is required for the cleaning or demolition work. If an air pollution permit is required, the Contractor shall obtain the permit. The Contractor shall furnish the Engineer with a copy of the permit application and the permit issued prior to starting cleaning or demolition activities. A copy of the Air Pollution Emission Notice [APEN] shall be provided to the Engineer, if such notice is required under the Colorado Air Quality Control Commission's regulations. The processing of air pollution permits in non-attainment areas, or where public hearings are required, likely will take more than 90 days.

(b) The Contractor shall contain paint chips, corrosion residues, and spent abrasives, herein referred to as waste materials, resulting from the cleaning or demolition operations. The Contractor shall not deposit or release waste material into the water, air or onto the ground below or adjacent to the structure. The Contractor shall conduct cleaning operations to minimize the waste materials produced. Prior to beginning the work, the Contractor shall submit to the Engineer for acceptance, a detailed methods statement for capturing, testing, and disposing of the removed materials. The Engineer will have seven calendar days to review, and accept or reject this methods statement.

(c) Abrasives utilized for blast cleaning shall be low-dusting and low waste. Unless approved otherwise, vacuum blasting or wheel blasting shall be used.

(d) The HSO shall sample and test the waste material for lead, chromium, and other paint associated

heavy metals using the Toxicity Characteristic Leaching Procedure (TCLP) Test, Method 1311 of the EPA publication, Test Methods for Evaluating Solid Waste 846. Sample collection methodology and frequency shall be recommended by the HSO and accepted by the Engineer with an adequate number of samples taken to be representative of all waste material collected. If the waste material does not pass the TCLP test, it shall be disposed of in a permitted TSD facility as designated in writing by the Engineer. The waste materials handling decision shall be documented by a report (five copies) submitted to the Engineer. This documentation shall include a description of sample collection methodology, testing performed, test results and comparison of test results with hazardous waste requirements. The waste material shall not be held at an unpermitted TSD facility site in excess of Resource Conservation and Recovery Act (RCRA) temporary storage time limits.

(e) When an item coated with paint is removed, all loose paint shall be removed and collected from the item within 24 hours of the time it is removed or placed onto the ground. All loose paint shall be removed and collected from a painted item before it is removed from the site. The Contractor shall contain loose paint until it is removed and collected. Loose paint is defined as that which can be removed by manual scraping methods. Over waterways, the Contractor shall capture all paint debris by the method specified in the methods statement. The paint debris shall be collected on a daily basis and shall be stored in a properly labeled, tightly sealed container and placed in a secured location at the end of each working day.

(f) All painted steel components which are not designated to be salvaged shall be recycled. Contractor possession of the steel for future use shall be considered a form of recycling. Prior to transport of the components off-site, the Contractor shall obtain a letter from the recipients of the painted steel components stating that they have been fully informed of the contents of the paint and are capable of handling the paint. If the Contractor is to maintain future possession of the steel, the Contractor shall supply this letter. If there will be more than one recipient of the painted material, one letter shall be obtained from each recipient. The Contractor shall provide a copy of each letter to the Engineer. If the painted steel components will be recycled by melting, the letter from the recipient is not required. The Contractor shall submit a letter stating the destination of the painted steel components and that they will be melted.

(g) When the work consists of the removal of a bridge or components of a bridge coated with paint which has been assumed to contain lead, chromium, other heavy metals, or a combination thereof the Contractor shall capture paint debris which is dislodged during removal operations. The Contractor may choose any method for dismantling the bridge, subject to the following required construction sequence limitations:

(1) The concrete deck shall be removed prior to removal of the steel superstructure.

(2) If the methods statement indicates that girders will be dropped to the ground during dismantling, all debris from the concrete deck removal operation shall be removed from the area below the bridge before any girders are dropped into this area.

(3) Girders may be cut and dropped only if the span is located entirely over land.

**250.05 Material Handling**. This work consists of the additional handling of groundwater and soils to be excavated for construction of the project which are suspected or known to be contaminated. This work also includes stockpiling or containerization, analytical sampling and testing, and final disposition of contaminated groundwater and soils requiring special handling.

The Contractor shall maintain vertical trench walls for the work in the specified areas of known or potential contamination, as shown on the plans. Shoring may be necessary to meet this requirement. The Contractor shall confine the removal of contaminated groundwater and soils encountered as a result of the excavation activities in the specified areas to the vertical and horizontal limits of structure excavation specified in the Contract. The Contractor shall be responsible for any contaminated

materials generated beyond the limits of excavation. This shall include any sampling, analysis, and disposal required, and the costs thereof. The Contractor shall be listed as the generator of any such material. The limits of excavation shall be determined as 18 inches outside of structures, including sewers, water lines, inlets, manholes, and other underground structures to be constructed, or as directed.

Specific areas of known or potential contamination have been identified in the project plans. There is the potential of encountering contaminated groundwater and soil, which has not been summarized in the plans or specifications, at unknown locations on the site. Suspected contaminated soil and groundwater shall be handled by one of three methods as follows:

(a) *Materials Handling (Stockpile& Containerization).* When recommended by the HSO and authorized by the Engineer, material shall be stockpiled or containerized for analysis and characterization for proper handling and, disposal, or both. Sampling and testing of materials shall be as described in the Contract. If analysis indicates that soil samples are designated as uncontaminated, as determined by the criteria shown in the Contract or as determined by the CDPHE, the associated soils will not require any special handling and will become the property of the Contractor and may be used on site, subject to other requirements of the Contract. Health and safety monitoring and strict fugitive dust control shall be conducted during the placement of these soils. If analysis indicates that groundwater samples are designated as uncontaminated, as determined by the criteria shown in the Contract or as determined by the CDPHE, the groundwater shall be handled in accordance with subsection 107.25.

Stockpiled and containerized materials shall be secured in compliance with the following provisions until they are determined to be uncontaminated:

1. The Contractor shall not store the material for more than 90 days.
2. The Contractor shall prevent any runoff from infiltrating the ground or running out of the containment area.
3. Soils and groundwater containing different contaminants shall be placed in separate containers or stockpiles.
4. The Contractor shall prevent the dispersion of materials or the dilution or mixing of containers and stockpiles.
5. The ground surface on which the contaminated soils will be placed shall be covered with plastic sheeting which will withstand the placement and removal of stockpiled materials without breaching.
6. The ground surface shall be graded to drain toward the edge of the soil piles and the berm or trench around them shall be covered by plastic sheeting.
7. Proper security shall be provided in accordance with 40 CFR.

(b) *Solid Waste Disposal.* Soils determined to be contaminated, but not hazardous, as established by criteria in the Contract or as determined by CDPHE or other regulatory agencies having jurisdiction, shall be handled and disposed of, or both as recommended by the HSO and approved by the Engineer. The Contractor shall haul this material to a solid waste disposal facility.

(c) *Contaminated Groundwater Disposal*. Groundwater determined to be contaminated, but not hazardous, as established by criteria in the Contract or as determined by CDPHE or other regulatory agencies having jurisdiction, shall be handled and disposed of, or both as recommended by the HSO and approved by the Engineer. *The* Contractor shall prepare a dewatering plan proposing at least three types of treatment and/or disposal options of contaminated groundwater as required by applicable statutes and regulations. One of the treatment options shall include permitting and onsite treatment prior to discharge or disposal. The dewatering plan shall be submitted to the Engineer for approval four weeks before

dewatering activities begin.

(d) *Hazardous Waste Disposal.* Soils and groundwater that are designated or suspected to be hazardous shall be containerized *immediately* upon excavation or upon discovery. Hazardous material shall be labeled and transported to a permitted treatment, storage and disposal (TSD) facility or to a hazardous waste disposal facility approved by the Engineer.

(e) *Additional Requirements.* Stockpiled or containerized material characterized as uncontaminated, contaminated or hazardous shall be stored and disposed of in a manner consistent with current established federal, state, and local regulations for waste materials.

Materials with contaminants not specifically regulated shall be disposed of by the Contractor as directed, in consultation with CDPHE. All areas where wastes are generated shall be reviewed by the HSO to identify potential contaminant sources that may result in a contaminated waste stream.

Contaminated groundwater and soils, which have been identified as solid waste or hazardous waste, requiring disposal according to federal, state, and local regulations, shall be transported in accordance with 49 CFR by the Contractor to an appropriately permitted treatment facility, landfill, incinerator or asphalt plant or other facility approved to accept the waste. CDPHE and the landfill or other treatment or disposal facility shall be notified by the HSO of the material to be disposed of and the corresponding analytical test results prior to shipment. Potentially contaminated water collected from the lined trench of a stockpile shall be treated as required by Colorado Wastewater Discharge Permit System (CDPS) permits, 29 CFR and 40 CFR and reimbursed separately in accordance with Contract requirements.

**250.06 Sample delivery**. This work consists of the collection, containerization and delivery of material samples for analysis to the testing facility designated in the Contract.

Environmental Protection Agency (EPA) protocol and standards shall be followed in the collection, containerization and transport of samples to be analyzed, including the documentation of the proper chain of custody of all samples. The Contractor shall collect sufficient sample material to perform the required analysis and is responsible for ensuring that appropriate climate control has been provided for sample transport. Sample delivery shall be made within the maximum allowable holding time for each sample type, not to exceed 24 hours, excluding weekends. The time period required for sample collection and delivery to the testing facility will not be considered an excusable delay. The analysis to be completed and turnaround time shall be approved by the Engineer.

The Contractor shall provide the Engineer with a copy of documentation indicating that proper chain of custody requirements have been followed for all samples.

Quality control samples shall be provided by the Contractor in accordance with the quality control requirements of the testing facility designated in the Contract (quality control requirements are available from the Engineer). The Contractor shall prepare, label and transport these samples to the testing facility in conjunction with the delivery of other samples authorized for analysis by the Engineer, at no additional cost.

The Engineer may request splits of samples, in advance of collection, which shall be provided at no additional cost by the Contractor.

**250.07 Asbestos-Containing Material Management**. Environmental documents or plans listed in the special provisions should include known or suspected locations that could involve encounters with ACM during excavation and other soil disturbing construction activities. Unexpected discoveries of ACM may be made during excavation and soil disturbing construction activities. Asbestos contaminated soil, shall be properly managed or remediated, in accordance with subsection 250.07(a).

All asbestos related activities shall be performed by Colorado certified asbestos professionals, contractors, or consultants. Certifications are issued by the Colorado Department of Public Health and Environment (CDPHE), Indoor Air Quality Unit. A Colorado Certified Asbestos professional shall manage the management and disposal of asbestos contaminated soil and other ACM. The Indoor Air Quality Unit within CDPHE is the only unit that certifies such professionals. The Contactor shall furnish a copy of the license to the Engineer.

(a) *Regulatory Compliance.* Asbestos contaminated soil management is governed by 6 CCR 1007-2, Section 5, which includes and references regulatory compliance with Asbestos Hazard Emergency Response Act (AHERA) Colorado *Regulation* 8; Inspection and reporting protocol and demolition standards are governed by AHERA; Demolition and notification standards are governed by National Emission Standards for Hazardous Air Pollutants (NESHAPS); Colorado Regulation 8 governs all asbestos activities, demolition, permitting, and certification of Certified Asbestos Professionals in the State of Colorado. Colorado Regulation 8 is more stringent than AHERA and NESHAPS and supersedes federal regulations. Conflicting regulatory requirements between AHERA and NESHAPS, if not specifically addressed in Colorado Regulation 8, shall be addressed and approved protocol negotiated with CDPHE. The Contractor shall conform to all current regulations, policy directives, or both, issued by the EPA, CDPHE, and the Department.

(b) *Asbestos Management and Visual Inspections* Asbestos management must be performed by a certified asbestos professional. Final Inspections of the area of asbestos contaminated soil removal shall be performed by an Asbestos Consultant to determine what, if any, controls must be instituted to allow future activity in the excavation area. All final visual inspections shall be conducted only when soil is dry.

(c) *Permitting and Notification.* The CDPHE requires notification of any soil disturbing activity where asbestos is known, suspected, or discovered. A 24-hour notification to CDPHE is required prior to any soil disturbing activity of an unplanned asbestos discovery. A 10 working day notification to CDPHE is required prior to any soil disturbing activity in an area with known or potential material suspected of containing asbestos in or on the soil or asbestos-contaminated soil. Removal of asbestos-containing material on a facility component, that is located on or in soil that will be disturbed, with asbestos quantities above the following trigger levels must be permitted and abated in accordance with the requirements of Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B):

(1) 260 linear feet on pipes,

(2) 160 square feet on other surfaces, or

(3) The volume of a 55-gallon drum.

All permit applications shall be submitted to the Colorado Department of Public Health and Environment a minimum of 10 days prior to start of work for approval. The permit application and notification shall be submitted simultaneously. The Contractor shall obtain all required State and local permits and shall be responsible for all associated fees. Permit application, notification, and waiver request forms shall be submitted to:

Colorado Department of Public Health and Environment Permit Coordinator/APCD - SS - B1 4300 Cherry Creek Drive South Denver, CO 80246-1530 Phone: (303) 692-3100 Fax: (303) 782-0278

Application and waiver forms are available on the CDPHE website:
asbestos@state.co.us

(d) *CDOT's Asbestos-Contaminated Soil Management Standard Operating Procedure, dated August 22, 2011.* Asbestos contaminated soil shall be managed in accordance with 6 CCR 1007-2, Section 5, Asbestos Waste Management Regulations. Regulations apply only upon discovery of asbestos materials during excavation and soil disturbing activities on construction projects, or when asbestos encounters are expected during construction. The contractor shall comply with procedures detailed in the CDPHE's Asbestos-Contaminated Soil Guidance Document and CDOT's approved *Asbestos-Contaminated Soil Management Standard Operating Procedure, dated August 22, 2011*, including the following minimum requirements:

(1) Immediate actions and implementation of interim controls to prevent visible emissions, exposure, and asbestos contamination in surrounding areas.

(2) Soil Characterization.

(3) Training required for all personnel involved in excavation and other soil disturbing activities, once asbestos is encountered during construction or on projects where asbestos encounters are expected. Asbestos Awareness Training shall be given by a qualified and certified Asbestos Building Inspector with a minimum of six months experience inspecting asbestos contaminated soil.

(4) Assessment for the presence and extent, within the proposed area of disturbance, of asbestos discoveries, whether expected or unexpected, by a Certified Asbestos Inspector.

(5) Investigation and sampling required for risk assessment and management. Investigation, if required, shall be conducted by a Certified Asbestos Inspector.

(6) Risk assessment and determinations for further management or abatement.

(i) Risk assessment and determinations must be made by a Certified Asbestos Inspector, and coordinated with the Engineer.

(ii) Soil remediation is not necessarily required, depending on the circumstances.

(7) Submit 24-hour Notification of Unplanned Asbestos Discovery.

(8) Submit 10-day Notification of Planned Asbestos Management.

(9) Submit 24-hour Notification of Unplanned Asbestos Discovery.

(10) Submit 10-day Notification of Planned Asbestos Management.

(e) *Risk Assessment and Determinations for Further Management Or Remediation.* Risk assessment and determinations for further management or remediation must be closely coordinated with the Project Engineer and Project Manager of the Statewide Management Plan.

**250.08 Methamphetamine Lab Sites**. Demolition of former Methamphetamine (meth) labs is enforced by the Governing Authority, which varies from county to county. The Contractor shall demolish all buildings that are identified as former meth labs, as listed in public listings by the Governing Authority. The Contractor shall provide evidence of demolition to the Governing Authority, obtain receipt of such evidence by the Governing Authority, and shall submit these to Engineer immediately following demolition.

Septic tank removal at known meth lab sites shall undergo preliminary assessment by an Industrial Hygienist or Certified Industrial Hygienist to determine proper removal and disposal. Work shall proceed in accordance with the recommendations of the Hygienist.

## METHOD OF MEASUREMENT

**250.09** Environmental Health and Safety Management will not be measured, but will be paid for on a lump sum basis. This will include all work, materials, and hourly time charges by the HSO and other

personnel required to accomplish the following:

(1) Preparation, submittal and briefing of the initial HASP

(2) Preparation and submittal of the Waste Management Plan

1. Preparation and Submittal of the Dewatering Plan
2. Preparation and Submittal of the Remediation Plan

(3) Procedures and equipment specified in subsections 250.03 - 250.07

(4) PPE (levels C and D) for Contractor's personnel for any contamination identified in the preconstruction investigations

(5) Preparation and submittal of the final site report

The quantity to be measured for Health and Safety Officer will be the total number of hours that the Health and Safety Officer is actually used, as authorized, for the following work:

(1) Field monitoring necessary to ensure the safety of workers on the site;

(2) Hours in excess of the items listed under Environmental Health and Safety Management;

(3) Hours that are necessary due to unforeseen site conditions; and

(4) Hours of additional consultation or field work that is requested by the Engineer.

Equipment specified in subsection 250.03(a), preparation and submittal of the daily HSO diary, travel to and from the project site, and PPE (Levels C and D) required for use by the HSO will not be measured and paid for separately, but shall be included in the hourly cost of the HSO.
The quantity to be measured for Monitoring Technician will be the total number of hours that Monitoring Technician is actually used as authorized. Equipment specified in subsection 250.03(b), supervision of the MT, preparation and submittal of the daily monitoring diary, travel to and from the project site, and PPE required for use by the MT (Levels C & D) will not be measured and paid for separately, but shall be included in the hourly cost of the MT.

Solid stockpiled materials will be measured by the cubic yard computed from cross sections by the average end area or other requirements acceptable method. Disposal of solid waste and solid hazardous waste materials will be measured by the cubic yard in the disposal container.

Materials Sampling and Delivery will be measured by the actual number of samples collected, containerized and transported to the testing facility indicated in the Contract.

Additional environmental health and safety management work required and authorized by the Engineer, but not included in the items listed above, will be considered extra work to be paid for in accordance with subsection 109.04, unless such work is caused by the Contractor's action.

## BASIS OF PAYMENT

**250.10** Partial payment for Environmental Health and Safety Management, as determined by the Engineer, will be made as the work progresses. The Contractor shall submit a schedule of environmental related Health and Safety Management work before the first partial payment is made. The schedule shall indicate the environmental related Health and Safety Management time for each work item that requires Contractor environmental related Health and Safety Management effort and the total time for the project.

The accepted quantity for Health and Safety Officer will be the number of hours actually used and approved for payment by the Engineer and will be paid for at the contract unit bid price.

The accepted quantity for Monitoring Technician will be the number of hours of onsite monitoring as approved by the Engineer and will be paid at the Contract unit price.

Environmental Health and Safety Management, Health and Safety Officer and Monitoring Technician bid items shall include vehicles, phone charges, supplies, printing, postage, office support, and all

other miscellaneous costs associated with the work.

Payment for Groundwater Handling (Containerization & Analysis) will be paid for in accordance with subsection 109.04. Payment for Soil Handling (Stockpile) will be made at the contract unit price for all excavated material required to be stockpiled for analysis. The contract unit price will be full compensation for furnishing all materials, labor, equipment and incidentals necessary to complete this work, and all handling of the material prior to disposal. This includes haul, stockpile, and security. Payment for this work will be in addition to any payment made under other bid items for excavation, embankment or backfill on the project, or waste disposal of this material.
Payment for Solid Waste Disposal and Solid Hazardous Waste Disposal will be made at the appropriate contract unit price for the disposal of material determined to be either solid waste or solid hazardous waste. The contract unit prices will be full compensation for furnishing all materials, labor, equipment, tools, storage containers for transport, containerization of material for up to 60 days, and incidentals necessary to complete this work. This includes all handling of the material, loading for disposal, unloading for disposal, and borrow material required for replacement of excavated material disposed of offsite. It does not include stockpiling or containerization required for analysis which is included in the item Materials Handling (Stockpile & Containerization) paid for as described above. Payment for waste disposal fees and transport of hazardous waste will be made as shown below. Payment for this work will be in addition to any payment made under other bid items for excavation, embankment, backfill or material handling (stockpile & containerization) on the project.

(1) *Solid Waste.* Transport costs to the disposal facility and disposal fees will be included in the contract unit price for this work.

(2) *Solid Hazardous Waste.* Transport, Disposal and /or Treatment costs will be paid for by planned force account in accordance with subsection 109.04.

(3) *Liquid Hazardous Waste.* Transport, Disposal and /or Treatment costs will paid for by planned force account in accordance with subsection 109.04.

The cost of shoring required to limit the removal of contaminated materials to the specified limits shall be included in the bid unit prices for any excavation to be performed. Such shoring ordered by the Engineer in areas other than the specified areas of known or potential contamination, as shown in the plans, will be paid for in accordance with subsection 109.04.

Payment for Materials Sampling and Delivery will be made at the contract unit price for each material sample collected, containerized and transported to the laboratory testing facility as designated in the Contract. The Contract unit price will be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete this work including required sampling kits, containers, sample splits and quality control samples.

The Contractor shall be responsible for damage caused by Contractor negligence to the environment, persons, or property. Expenditures associated with actions of the Contractor shall be borne by the Contractor at no cost to the project.

Contaminated groundwater containerized, treated or disposed under the requirements of this specification will be paid for by planned force account in accordance with subsection 109.04.

The accepted quantities will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule.

| Pay Item | Pay Unit |
|---|---|
| **Environmental Health and Safety Management** | Lump Sum |
| **Health and Safety Officer** | Hour |
| **Monitoring Technician** | Hour |

| | |
|---|---|
| **Materials Sampling and Delivery** | Each |
| **Materials Handling (Stockpile)** | Cubic Yard |
| **Solid Waste Disposal** | Cubic Yard |

**REVISION OF SECTIONS 412, 601 AND 711**
**LIQUID MEMBRANE-FORMING COMPOUNDS FOR CURING CONCRETE**

Sections 412, 601 and 711 of the Standard Specifications are hereby revised for this project as follows:

In subsection 412.14, first paragraph, delete the second sentence and replace with the following:
The impervious membrane curing compound shall meet the requirements of ASTM C 309, Type 2 and shall be volatile organic content (VOC) compliant.

In subsection 601.13 (b), first paragraph, delete the second sentence and replace with the following:
A volatile organic content (VOC) compliant curing compound conforming to ASTM C 309, Type 2 shall be used on surfaces where curing compound is allowed, except that Type 1 curing compound shall be used on exposed aggregate or colored concrete, or when directed by the Engineer.

In subsection 601.16 (a) 1., delete the first sentence and replace with the following:

1. Membrane Forming Curing Compound Method. A volatile organic content (VOC) compliant curing compound conforming to ASTM C 309, Type 2 shall be uniformly applied to the surface of the deck, curbs and sidewalks at the rate of 1 gallon per 100 square feet.

Delete subsection 711.01 and replace with the following:
**711.01 Curing Materials.** Curing materials shall conform to the following requirements:

| | |
|---|---|
| Burlap Cloth made from Jute or Kenaf | AASHTO M 182 |
| Liquid Membrane-Forming Compounds for Curing Concrete | ASTM C 309 |
| Sheet Materials for Curing Concrete | AASHTO M 171* |
| *Only the performance requirements of AASHTO M171 shall apply. | |

Straw used for curing shall consist of threshed straw of oats, barley, wheat, or rye. Clean field or marsh hay may be substituted for straw when approved by the Engineer. Old dry straw or hay which breaks readily in the spreading process will not be accepted.

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**REVISION OF SECTION 512**
**BEARING DEVICE TESTING**

Section 512 of the Standard Specifications is hereby revised for this project as follows:

Delete the first paragraph of subsection 512.09 and replace with the following:

**512.09 Testing and Acceptance.** The materials for elastomeric bearings and finished bearings shall be subjected to the tests described in this section. Material tests shall be in accordance with Table 705-1 or 705-2 and as described herein. The manufacturer shall furnish facilities for the testing and inspection of the completed bearings in the plant or at an independent test facility. At the Engineer's discretion, testing may be performed in the presence of the Engineer or a designated representative. The Engineer or the Engineer's representative shall be allowed free access to the necessary parts of the manufacturer's plant and test facility, as arranged by the Contractor. The Contractor shall inform the Engineer a minimum of two weeks in advance of a date and time when a visit to the plant and test facility would be permitted.

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**REVISION OF SECTION 518**
**BRIDGE EXPANSION DEVICE**

Section 518 of the Standard Specifications is hereby revised for this project as follows:

In subsection 518.04, delete the fifth paragraph and replace with the following:

All structural steel elements of the bridge expansion device, including cover plates, shall be galvanized after fabrication in accordance with Section 509, whether or not they are in contact with the elastomeric seals.

In subsection 518.05 (b), delete the third paragraph and replace with the following:

All structural steel elements of the bridge expansion device, including cover plates, shall be galvanized after fabrication in accordance with Section 509, whether or not they are in contact with the elastomeric seals.

**REVISION OF SECTION 601**
**CONCRETE BATCHING**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

In subsection 601.06, delete (13) and (17) and replace with the following:

(13) Gallons of water added by truck operator, the time the water was added and the quantity of concrete in the truck each time water is added.

(17) Water to cementitious material ratio.

**REVISION OF SECTIONS 601**
**CONCRETE FINISHING**

Section 601of the Standard Specifications are hereby revised for this project as follows:

In subsection 601.12 (a) delete the fifth paragraph and replace it with the following:

Water shall not be added to the surface of the concrete to assist in finishing operations.

Hand finishing should be minimized wherever possible. The hand finishing methods shall be addressed in the Quality Control Plan for concrete finishing. Hand finished concrete shall be struck off and screeded with a portable screed that is at least 2 feet longer than the maximum width of the surface to be struck off. It shall be sufficiently rigid to retain its shape. Concrete shall be thoroughly consolidated by hand vibrators. Hand finishing shall not be allowed after concrete has been in-place for more than 30 minutes or when initial set has begun. Finishing tools made of aluminum shall not be used.

The Contractor shall provide a Quality Control Plan (QCP) to ensure that proper hand finishing is accomplished in accordance with current Industry standards. It shall identify the Contractor's method for ensuring that the provisions of the QCP are met. The QCP shall be submitted to the Engineer at the Preconstruction Conference. Concrete placement shall not begin until the Engineer has approved the QCP. The QCP shall identify and address issues affecting the quality finished concrete including but not limited to:

(1) Timing of hand finishing operations
(2) Methodology to place and transport concrete
(3) Equipment and tools to be utilized
(4) Qualifications and training of finishers and supervisors

When the Engineer determines that any element of the approved QCP is not being implemented or that hand finished concrete is unacceptable, work shall be suspended. The Contractor shall supply a written plan to address improperly placed material and how to remedy future hand finishing failures and bring the work into compliance with the QCP. The Engineer will review the plan for acceptability prior to authorizing the resumption of operations.

In subsection 601.14(a) delete the fourth paragraph.

**REVISION OF SECTION 601**
**CONCRETE FORM AND FALSEWORK REMOVAL**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

In subsection 601.09, delete (h) and replace with the following:

(h) *Removal of Forms*. The forms for any portion of the structure shall not be removed until the concrete is strong enough to withstand damage when the forms are removed.

Unless specified in the plans, forms shall remain in place for members that resist dead load bending until concrete has reached a compressive strength of at least 80 percent of the required 28 day strength, 0.80f'c. Forms for columns shall remain in place until concrete has reached a compressive strength of at least 1,000 psi. Forms for sides of beams, walls or other members that do not resist dead load bending shall remain in place until concrete has reached a compressive strength of at least 500 psi.

Forms and supports for cast-in-place concrete box culverts (CBCs) shall not be removed until the concrete compressive strength exceeds 0.6 $f_c'$ for CBCs with spans up to and including 12 feet, and 0.67 $f_c'$ for CBCs with spans exceeding 12 feet but not larger than 20 feet. Forms for CBCs with spans larger than 20 feet shall not be removed until after all concrete has been placed in all spans and has attained a compressive strength of at least 0.80f'c.

Concrete compressive strength shall be determined using information concrete cylinders or by maturity meters. At the pre-pour conference, the Contractor shall submit the method of determining the structure's strength and the location where information cylinders will be taken or maturity meters placed.

If information cylinders are used they shall be cast by the Contractor and cured in the same manner as the structure. A set of information cylinders shall be taken for each concrete placement on the structure. A set of information cylinders shall be taken for any load of concrete that is being placed at the mid-span of beams and at support locations and other locations as directed by the Engineer. Casting of the information cylinders will be witnessed by the Engineer. The information cylinders shall remain in the molds and cured in the same manner as the structure until they are tested in the laboratory by the Engineer. Compressive strength shall be determined using the compressive strength of at least two information cylinders. The contractor shall be responsible for protecting the information cylinders from damage.

Prior to placement of concrete whose strength will be determined with maturity meters, the Contractor shall provide the Engineer a report of maturity relationships in accordance with CP 69. The Contractor shall provide maturity meters and all necessary wires and connectors. The Contractor shall be responsible for the placement and maintenance of the maturity meter and wire. . At a minimum a maturity meter will be placed at the mid-span of beams and at support locations. Placement shall be as directed by the Engineer.

For structures with multiple sets of information cylinders or maturity meters, the lowest compressive strength shall determine when the forms can be removed.

Acceptance cylinders shall not be used for determining compressive strength to remove forms.

When field operations are controlled by information cylinder tests or maturity meter, the removal of forms, supports and housing, and the discontinuance of heating and curing may begin when the concrete is found to have the required compressive strength.

Forms for median barrier, railing or curbs, may be removed at the convenience of the Contractor after the concrete has hardened.

All forms shall be removed except permanent steel bridge deck forms and forms used to support hollow abutments or hollow piers when no permanent access is available into the cells. When permanent access is provided into box girders, all interior forms and loose material shall be removed, and the inside of box girders shall be cleaned.

In subsection 601.11, delete (e) and replace with the following:

*(e) Falsework Removal*. Unless specified in the plans or specifications, falsework shall remain in place until concrete has attained a minimum compressive strength of 0.80f'c.

Falsework supporting any span of a simple span bridge shall not be released until after all concrete, excluding concrete above the bridge deck, has attained a compressive strength of at least 0.80f'c.

Falsework supporting any span of a continuous or rigid frame bridge shall not be released until after all concrete, excluding concrete above the bridge deck, has been placed in all spans and has attained the compressive strength of at least 0.80f'c.

Falsework for arch bridges shall be removed uniformly and gradually, beginning at the crown, to permit the arch to take its load slowly and evenly.

Falsework supporting overhangs and deck slabs between girders shall not be released until the deck concrete has attained a compressive strength of at least 0.80f'c.

Falsework for pier caps which will support steel or precast concrete girders shall not be released until the concrete has attained a compressive strength of at least 0.80f'c. Girders shall not be erected onto such pier caps until the concrete in the cap has attained the compressive strength of at least 0.80f'c.

Falsework for cast-in-place prestressed portions of structures shall not be released until after the pre-stressing steel has been tensioned.

Concrete compressive strength shall be determined using information concrete cylinders or by maturity meters. At the pre-pour conference, the Contractor shall submit the method of determining the structure's strength and the location that information cylinders will be taken or maturity meters placed.

If information cylinders are used they shall be cast by the Contractor and cured in the same manner as the structure. A set of information cylinders shall be taken for each concrete placement on the structure. A set of information cylinders shall be taken for any load of concrete that is being placed at the mid-span of beams and at support locations and other locations as directed by the Engineer. Casting of the information cylinders will be witnessed by the Engineer. The information cylinders shall remain in the molds and cured in the same manner as the structure until they are tested in the laboratory by the Engineer. Compressive strength shall be determined using the compressive strength of at least two information cylinders. The Contractor shall be responsible for protecting the information cylinders from damage.

Prior to placement of concrete whose strength will be determined with maturity meters, the Contractor shall provide the Engineer a report of maturity relationships in accordance with CP 69. The Contractor shall provide maturity meters and all necessary wires and connectors. The Contractor shall be responsible for the placement and maintenance of the maturity meters and wires. At a minimum a maturity meter will be placed at the mid-span of beams and at support locations. Placement shall be as directed by the Engineer.

For structures with multiple sets of information cylinders or maturity meters, the lowest compressive strength shall determine when the falsework can be removed.

Acceptance cylinders shall not be used for determining compressive strength to remove falsework.

**REVISION OF SECTION 601**
**CONCRETE SLUMP ACCEPTANCE**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

Delete the fifth paragraph of Subsection 601.05 and replace with the following:

Except for Class BZ concrete, the slump of the delivered concrete shall be the slump of the approved concrete mix design plus or minus 2.0 inch. The laboratory trial mix must produce an average compressive strength at least 115 percent of the required field compressive strength specified in Table 601-1. When entrained air is specified in the Contract for Class BZ concrete, an air entraining admixture may be added to an approved Class BZ mix design. A new trial mix will not be required.

Delete Subsection 601.17 (b), 601.17 (d) and Table 601-3 and replace with the following:

*(b) Slump*. Slump acceptance, but not rejection, may be visually determined by the Engineer. Any batch that exceeds the slump of the approved concrete mix design by 2.0 inches will be retested. If the slump is exceeded a second time, that load is rejected. If the slump is greater than 2 inches lower than the approved concrete mix design, the load can be adjusted with a water reducer, or by adding water (if the w/cm allows) and retested.

Portions of loads incorporated into structures prior to determining test results which indicate rejection as the correct course of action shall be subject to reduced payment or removal as determined by the Engineer.

(d) *Pay Factors*. The pay factor for concrete which is allowed to remain in place at a reduced price shall be according to Table 601-3 and shall be applied to the unit price bid for Item 601, Structural Concrete.

If deviations occur in air content and strength within the same batch, the pay factor for the batch shall be the product of the individual pay factors.

**Table 601-3**
**PAY FACTORS**

| Percent Total Air | | Strength | | |
|---|---|---|---|---|
| **Deviations From Specified Air (Percent)** | **Pay Factor (Percent)** | **Below Specified Strength (psi) [ < 4500 psi Concrete]** | **Pay Factor (Percent)** | **Below Specified Strength (psi) [ ≥ 4500 psi Concrete]** |
| 0.0-0.2 | 98 | 1-100 | 98 | 1-100 |
| 0.3-0.4 | 96 | 101-200 | 96 | 101-200 |
| 0.5-0.6 | 92 | 201-300 | 92 | 201-300 |
| 0.7-0.8 | 84 | 301-400 | 84 | 301-400 |
| 0.9-1.0 | 75 | 401-500 | 75 | 401-500 |
| Over 1.0 | Reject | Over 500 | Reject | |
| | | | 65 | 501-600 |
| | | | 54 | 601-700 |
| | | | 42 | 701-800 |
| | | | 29 | 801-900 |
| | | | 15 | 901-1000 |
| | | | Reject | Over 1000 |

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**REVISION OF SECTION 601**
**ENTRAINED AIR OF CLASS BZ CONCRETE**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

In Subsection 601.05, delete the fifth paragraph and replace with the following:

Except for Class BZ concrete, the slump of the delivered concrete shall be the slump of the approved concrete mix design plus or minus 2.0 inch. The laboratory trial mix must produce an average compressive strength at least 115 percent of the required field compressive strength specified in Table 601-1. When entrained air is specified in the Contract for Class BZ concrete, the trial mix shall be run with the required air content

**REVISION OF SECTION 601**
**QC TESTING REQUIREMENTS FOR STRUCTURAL CONCRETE**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

Delete the first paragraph of subsection 601.17 and subsection 601.17(a) and replace with the following:

**601.17 Acceptance and Pay Factors.** These provisions apply to all concrete. The Contractor shall sample 601 pay items for both QC and QA in accordance with CP 61. The Engineer will witness the sampling and take possession of the QA samples at a mutually agreed upon location. The Contractor shall be responsible for Quality Control (QC) testing for 601 pay items. QC testing shall be performed at least once per day and then once per 50 cubic yards for concrete slump, unit weight and concrete temperature for each 601 pay item.

(a) *Air Content*. The first three batches at the beginning of each day's production for each 601 pay item shall be tested by the Contractor's QC and CDOT's QA for air content. When the QC and QA air content measurements differ by more than 0.5 percent, both the QC and QA air meters shall be checked in accordance with ASTM C 231. When air content is below the specified limit, it may be adjusted in accordance with subsection 601.08. Successive batches shall be tested by the Contractor's QC and witnessed by the Engineer until three consecutive batches are within specified limits. After the first three batches, CDOT will follow the random minimum testing schedule. After the first three batches the Contractor shall perform QC testing at a frequency of one random sample per 50 cubic yards. Air content shall not be adjusted after a CDOT QA test.

Subsection 601.19 shall include the following:

The Contractor's QC testing will not be measured and paid separately, but shall be included in the work.

**REVISION OF SECTION 601**
**STRUCTURAL CONCRETE STRENGTH ACCEPTANCE**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

In subsection 601.17 (c), delete the first paragraph and replace with the following:

(c) *Strength (When Specified).* The concrete will be considered acceptable when the running average of three consecutive strength tests per mix design for an individual structure is equal to or greater than the specified strength and no single test falls below the specified strength by more than 500 psi. A test is defined as the average strength of three test cylinders cast in plastic molds from a single sample of concrete and cured under standard laboratory conditions prior to testing. If the compressive strength of any one test cylinder differs from the average by more than 10 percent that compressive strength will be deleted and the average strength will be determined using the compressive strength of the remaining two test cylinders.

**REVISION OF SECTIONS 601 AND 701**
**CEMENTS AND POZZOLANS**

Sections 601 and 701 of the Standard Specifications are hereby revised for this project as follows:

In subsection 601.03, first paragraph, the following shall be added to the table:

High-Reactivity Pozzolans 701.04

Subsection 601.03 shall include the following:

Pozzolans shall consist of Fly Ash, Silica Fume and High-Reactivity Pozzolan.

In subsection 601.04, delete the third and fourth paragraphs and replace with the following

Cementitious material requirements are as follows:

Class 0 requirements for sulfate resistance shall be one of the following:

(1) ASTM C 150 Type I, II or V

(2) ASTM C 595 Type IL, IP, IP(MS), IP(HS) or IT

(3) ASTM C 1157 Type GU, MS or HS

(4) ASTM C 150 Type III cement if it is allowed, as in Class E concrete

Class 1 requirements for sulfate resistance shall be one of the following:

(1) ASTM C 150 Type II or V; Class C fly ash shall not be substituted for cement.

(2) ASTM C 595 Type IP(MS) or IP(HS).

(3) ASTM C 1157 Type MS or HS; Class C fly ash shall not be substituted for cement.

(4) When ASTM C 150 Type III cement is allowed, as in Class E concrete, it shall have no more than 8 percent C3A. Class C fly ash shall not be substituted for cement.

(5) ASTM C 595 Type IL; having less than 0.10 percent expansion at 6 months when tested according to ASTM C 1012. Class C fly ash shall not be substituted for cement.

(6) ASTM C 595 Type IT; having less than 0.10 percent expansion at 6 months when tested according to ASTM C 1012.

Class 2 requirements for sulfate resistance shall be one of the following:

(1) ASTM C 150 Type V with a minimum of a 20 percent substitution of Class F fly ash by weight

(2) ASTM C 150 Type II or III with a minimum of a 20 percent substitution of Class F fly ash by weight. The Type II or III cement shall have no more than 0.040 percent expansion at 14 days when tested according ASTM C 452

(3) ASTM C 1157 Type HS; Class C fly ash shall not be substituted for cement.

(4) ASTM C 150 Type II, III, or V plus High-Reactivity Pozzolan where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C 1012

(5) ASTM C 1157 Type MS plus Class F fly ash or High-Reactivity Pozzolan where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C 1012

(6) A blend of portland cement meeting ASTM C 150 Type II or III with a minimum of 20 percent Class F fly ash by weight, where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C 1012.

(7) ASTM C 595 Type IP(HS).

(8) ASTM C 595 Type IL plus Class F fly ash or High-Reactivity Pozzolan where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C 1012

(9) ASTM C 595 Type IT; having less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C 1012.

Class 3 requirements for sulfate resistance shall be one of the following:

A blend of portland cement meeting ASTM C 150 Type II, III, or V with a minimum of a 20 percent substitution of Class F fly ash by weight, where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

(1) ASTM C 1157 Type HS having less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012. Class C fly ash shall not be substituted for cement.

(2) ASTM C 1157 Type MS or HS plus Class F fly ash or High-Reactivity Pozzolan where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

(3) ASTM C 150 Type II,III, or V plus High-Reactivity Pozzolan where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

(4) ASTM C 595 Type 1L plus High-Reactivity Pozzolan where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

(5) ASTM C 595 Type IP(HS) or IT having less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

(6) ASTM C 595 Type IL with a minimum of a 20 percent substitution of Class F fly ash by weight, where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

When fly ash or High-Reactivity Pozzolan is used to enhance sulfate resistance, it shall be used in a proportion greater than or equal to the proportion tested in accordance to ASTM C1012, shall be the same source and it shall have a calcium oxide content no more than 2.0 percent greater than the fly ash or High-Reactivity Pozzolan tested according to ASTM C 1012.

In subsection 601.05 delete the first paragraph and replace with the following:

**601.05 Proportioning.** The Contractor shall submit a Concrete Mix Design for each class of concrete being placed on the project. Concrete shall not be placed on the project before the Concrete Mix Design Report has been reviewed and approved by the Engineer. The Concrete Mix Design will be reviewed and approved following the procedures of CP 62. The Concrete Mix Design will not be approved when the laboratory trial mix data are the results from tests performed more than two years in the past or aggregate data are the results from tests performed more than two years in the past. The concrete mix design shall show the weights and sources of all ingredients including cement, pozzolan, aggregates, water, additives and the water to cementitious material ratio (w/cm). When

determining the w/cm, the weight of cementitious material (cm) shall be the sum of the weights of the cement, fly ash, silica fume and High-Reactivity Pozzolan.

In subsection 601.05, delete the 12th, 13th, 14th, 15th, and 16th paragraphs and replace with the following:

The Concrete Mix Design Report shall include Certified Test Reports showing that the cement, fly ash, High-Reactivity Pozzolan and silica fume meet the specification requirements and supporting this statement with actual test results. The certification for silica fume shall state the solids content if the silica fume admixture is furnished as slurry.

For all concrete mix designs with ASTM C150 cements, up to a maximum of 20 percent Class C, 30 percent Class F or 30 percent High-Reactivity Pozzolan by weight of total cementitious material may be substituted for cement.

For all concrete mix designs with ASTM C595 Type IL cements, up to a maximum of 20 percent Class C, 30 percent Class F or 30 percent High-Reactivity Pozzolan by weight of total cementitious material may be substituted for cement.

For all concrete mix designs with ASTM C595 Type IP, IP(MS), IP(HS) or IT cements; fly ash or High-Reactivity Pozzolan shall not be substituted for cement.

For all concrete mix designs with ASTM C1157 cements, the total pozzolan content including pozzolan in cement shall not exceed 30 percent by weight of the cementitious material content.

When the Contractor's use of fly ash or High-Reactivity Pozzolan results in delays to the project, when it is necessary to make changes in admixture quantities, the source, or the Contractor performs , the cost of such delays and corrective actions shall be borne by the Contractor.

The Contractor shall submit a new Concrete Mix Design Report meeting the above requirements when a change occurs in the source, type, or proportions of cement, fly ash, High-Reactivity Pozzolan, silica fume or aggregate. When a change occurs in the source of approved admixtures, the Contractor shall submit a letter stamped by the Concrete Mix Design Engineer approving the changes to the existing mix design. The change will need to be approved by the Engineer prior to use.

In subsection 601.06, second paragraph, delete (9) and replace with the following:

(9) Type, brand, and amount of cement, fly ash and High-Reactivity Pozzolan

In subsection 601.06, delete (a) and replace with the following:

(a) *Portland Cement, Fly Ash, High-Reactivity Pozzolan and Silica Fume*. These materials may be sacked or bulk. No fraction of a sack shall be used in a batch of concrete unless the material is weighed.

All bulk cement shall be weighed on an approved weighing device. The bulk cement weighing hopper shall be sealed and vented to preclude dusting during operation. The discharge chute shall be so arranged that cement will not lodge in it or leak from it.

Separate storage and handling equipment shall be provided for the fly ash, silica fume and High-Reactivity Pozzolan. The fly ash, silica fume, and High-Reactivity Pozzolan may be weighed in the cement hopper and discharged with the cement.

In subsection 701.01 delete and replace the second paragraph with the following:

All concrete, including precast, prestressed and pipe shall be constructed with one of the following hydraulic cements, unless permitted otherwise.

ASTM C 150 Type I
ASTM C 150 Type II
ASTM C 150 Type V
ASTM C 595 Type IL
ASTM C 595 Type IP
ASTM C 595 Type IP(MS)
ASTM C 595 Type IP(HS)
ASTM C 595 Type IT
ASTM C 1157 Type GU, consisting of no more than 15 percent limestone
ASTM C 1157 Type MS, consisting of no more than 15 percent limestone
ASTM C 1157 Type HS, consisting of no more than 15 percent limestone

In subsection 701.02 add the following after the first paragraph:

Blending of pozzolans according to ASTM D5370 is permitted to meet the requirements of ASTM C 618.

Add subsection 701.04 immediately following subsection 701.03 as follows:

**701.04 High-Reactivity Pozzolans**. High-Reactivity Pozzolans (HRP) shall conform to the requirements of AASHTO M321. HRPs are but not limited to metakaolin, rice hull ash, zirconium fume, ultra-fine fly ash, and fume from the production of 50 percent ferrosilicon (with SiO2 less than 85 percent).

HRPs shall meet the following optional requirement of AASHTO M321: The sulfate expansion at 14 days shall not exceed 0.045 percent

HRP shall be from a preapproved source listed on the Department's Approved Products List. The HRP intended for use on the project shall have been tested and accepted prior to its use. Certified Test Reports showing that the HRP meets the specification requirements and supporting this statement with actual test results shall be submitted to the Engineer.

The HRP shall be subject to sampling and testing by the Department. Test results that do not meet the physical and chemical requirements may result in the suspension of the use of HRP until the corrections necessary have been taken to ensure that the material conforms to the specifications.

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PCN 16986 November 18th, 2015

**REVISION OF SECTION 603**
**CULVERT PIPE INSPECTION**

Section 603 of the Standard Specifications is hereby revised for this project as follows:

Delete the first paragraph of subsection 603.09 and replace with the following:

**603.09 Backfilling**. After the conduit or section of conduit is placed, it shall be inspected before any backfill is placed. Reinforced concrete pipe (RCP) shall be visually inspected in accordance with AASHTO LRFD Bridge Construction Specifications, Section 27.6. Conduit found to be damaged shall be replaced, and conduit found to be out of alignment or unduly settled shall be taken up and relaid. The trench shall then be backfilled with material in accordance with Section 206.
In subsection 603.09, delete the fifth paragraph.
Add subsection 603.091 immediately following subsection 603.09 as follows:
**603.091 Deflection Testing of Metal and Plastic Pipe**. After a metal or plastic pipe is backfilled and earthwork over the pipe is complete to the top of the subgrade, the pipe deflection shall be measured in the presence of the Engineer. The maximum allowable deflection shall be 5 percent. Deflection is a reduction in the nominal diameter of the pipe measured in any direction. Measurement shall be made using a mandrel, laser profile, or other method approved by the Engineer. Measurement shall be made 30 days or more following the pipe installation. Pipe having any deflections in excess of 5 percent at any location within the pipe shall be removed and reinstalled at the Contractor's expense. Pipe that is permanently deformed or damaged in any way shall be replaced at the Contractor's expense. Replaced pipe shall be retested 30 days or more after the installation in accordance with the method described above.

**REVISION OF SECTIONS 603, 624, 705, 707, 712**
**DRAINAGE PIPE**

Sections 603, 624, 705, 707 and 712 of the Standard Specifications are hereby revised for this project as follows:

Subsection 603.07 shall include the following:

Joint systems for siphons, irrigation systems, and storm drains shall be watertight.

Subsection 603.07(c) shall include the following:

Watertight joint systems for plastic pipe shall conform to subsection 705.03.

Subsection 624.02 shall include the following material type and requirement:

| **Abbreviation** | **Description** | **Subsection** |
|---|---|---|
| ALT2 CSP | Aluminized Corrugated Steel Pipe Type 2 | 707.11 |
| Plastic | Polyvinyl Chloride (PVC), Polyethylene (PE), Steel Reinforced Polyethylene (SRPE) and Polypropylene (PP) | 712.13 |

In subsection 624.02 delete the third paragraph and replace it with the following:

Connecting bands shall receive the same corrosion protection as the pipe with which they are used. Coatings conforming to the requirements of Sections 706 and 707 will be permitted as applicable. Connecting bands and pipe extensions shall be of similar metal, or of non-metallic material, to avoid galvanic corrosion.

End sections for concrete or metal pipe shall be the same material as the pipe and meet the requirements for the same class as that specified for the pipe in accordance with Table 624-1.

Plastic end sections shall not be used. When plastic pipe is to be installed with end sections, steel or concrete end sections meeting the same class as that specified for the pipe in accordance with Table 624-1 shall be used.

In subsection 624.02 delete the fourth paragraph and replace it with the following:

The Contractor may furnish any pipe material allowed in Table 624-1 for the class of pipe specified in the Contract except for storm drains. The Contractor may furnish RCP, PVC, SRPE or PP allowed in Table 624-1 for the class of pipe specified in the Contract for storm drains. The Contractor shall state at the preconstruction conference the pipe materials intended to be furnished.

In subsection 624.02 delete Table 624-1 and replace it with the following:

**TABLE 624-1**
**Materials Allowed for Class of Pipe**

| **Material Allowed**** | **Class of Pipe*** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0** | **1** | **2** | **3** | **4** | **5** | **6**[4] | **7** | **8** | **9** | **10**[4] |
| CSP | Y | N | N | N | N | N | N | N | N | N | N |
| ALT2 CSP | Y | Y | Y | Y | Y | N | N | N | N | N | N |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit. Co. CSP | Y | Y[1] | N | N | N | N | N | N | N | N | N |
| A.F. Bo. CSP | Y | Y | Y | Y | Y | Y | Y | N | N | N | N |
| CAP | Y | Y[2] | Y[2] | Y[2] | Y[2] | Y | N | N | N | N | N |
| PCSP - both sides | Y | Y | Y | Y | Y | Y | Y | N | N | N | N |
| PVC[6] | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| PE[6] | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| PP[6] | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| SRPE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| RCP (SP0)[3,5] | Y | Y | N | N | N | N | N | Y | N | N | N |
| RCP (SP1)[3,5] | Y | Y | Y | N | N | N | N | Y | Y | N | N |
| RCP (SP2)[3,5] | Y | Y | Y | Y | Y | N | N | Y | Y | Y | N |
| RCP (SP3)[3,5] | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |

* As determined by the Department in accordance with the CDOT *Pipe Selection Guide*. Determination is based on abrasion and corrosion resistance.

** Y=Yes; N=No.

[1] Coated Steel Structural Plate Pipe of equal or greater diameter, conforming to Section 510, may be substituted for Bit. Co. CSP at no additional cost to the project.

[2] Aluminum Alloy Structural Plate Pipe of equal or greater diameter, conforming to Section 510, may be substituted for CAP at no additional cost to the project.

[3] SP= Class of Sulfate Protection required in accordance with subsection 601.04 as revised for this project. RCP shall be manufactured using the cementitious material required to meet the SP class specified.

[4] For pipe classes 6 and 10, the RCP shall be coated in accordance with subsection 706.07 when the pH of either the soil or water is less than 5. The Contract will specify when RCP is to be coated.

[5] Concrete shall have a compressive strength of 4500 psi or greater.

[6] In accordance with subsection 712.13.

Subsection 624.03 shall include the following:

Joint systems for siphons, irrigation systems, and storm drains shall be watertight. Watertight joint systems for plastic pipe shall conform to subsection 705.03.

Installation for Aluminized Corrugated Steel Pipe Type 2 shall conform to all requirements for Corrugated Steel Pipe (CSP) including the fill height tables and requirements in Standard Plan M-603-1.

Subsection 705.03 shall include the following:

Watertight joint systems for plastic pipe shall be in accordance with ASTM D3212.

Add subsection 707.11 as follows:

**707.11 Aluminized Corrugated Steel Pipe Type 2.** Aluminized Corrugated Steel Pipe Type 2 shall conform to the requirements of AASHTO M 274.

In subsection 712.13 (b), delete (1) and (2) and replace with the following:

(1) AASHTO M 304 (Profile) for nominal pipe sizes of 4 to 36 inches.
(2) ASTM F794 (Profile) for nominal pipe sizes 4 to 36 inches with 46 psi minimum pipe stiffness

Add subsection 712.13 and (c) and (d) as follows:

(c) *Polypropylene (PP) Pipe.*

AASHTO M330 for nominal pipe sizes of 12 to 60 inches with the following exceptions: Type S and Type SP are acceptable (Type C, Type CP and Type D will not be accepted).

The Contractor shall provide a polypropylene (PP) pipe product that is prequalified under the AASHTO National Transportation Product Evaluation Program (NTPEP). Only products from suppliers whose manufacturing plant and PP pipe products comply with this specification shall be placed by the Contractor. The current list of plants and PP pipe products that meet these requirements is located at: www.ntpep.org. The Contractor shall use plants listed as compliant and a size listed in the NTPEP reports on PP Thermoplastic Pipe. Every Certificate of Compliance (COC) on each diameter PP pipe product delivered to the project shall include a statement that the product has been manufactured at a NTPEP inspected plant, has been tested by NTPEP, has a NTPEP product number, and is currently on the NTPEP website. The COC shall confirm that the supplied pipe meets the applicable specification limits in subsection 712.13. Manufacturers shall remain acceptable to CDOT as long as the results of verification samples and performance in the field are satisfactory. Any changes in the PP pipe formulation will require re-submittal for prequalification testing by NTPEP.

(d) *Steel Reinforced Polyethylene (SRPE)*. SRPE pipe shall be AASHTO MP 20 ribbed pipe for nominal pipe sizes 12 to 60 inches with the following exceptions:

(1) Nominal pipe sizes 30 to 60 inches are acceptable; nominal pipe sizes 12 to 27 inches will not be accepted.

**REVISION OF SECTION 618**
**PRESTRESSED CONCRETE**

Section 618 of the Standard Specifications is hereby deleted for this project and replaced with the following:

## DESCRIPTION

**618.01** This work consists of fabricating, furnishing and installing prestressed concrete members in accordance with the requirements of the Contract.

This work includes the furnishing and installation of all appurtenant items necessary for the particular prestressing systems to be used, including but not limited to ducts, anchorage assemblies and grout used for pressure grouting ducts.

For cast-in-place prestressed concrete, the term "member" as used herein shall be considered to mean the concrete which is to be prestressed.

The term "tendon" as referenced herein shall be considered to mean the prestressing steel within a duct.

Both temporary and permanent post-tensioning shall comply with the requirements of this Section.

The term temporary post-tensioning is referring to the post-tensioning required to control stresses during handling and erection of precast elements.

## MATERIALS

**618.02** Materials shall conform to the following:

Anchorage devices shall meet the requirements of subsection 714.02. Prestressing steel shall meet the requirements of subsection 714.01.

Elastomeric bearing pads shall meet the requirements of subsection 512.

All reinforcing and embedment item supports, bolsters, chairs, and spacers shall be CDOT approved. These items shall be plastic, rubber, or epoxy coated at all areas that will contact external concrete surfaces, unless otherwise shown on the plans.

(a) *Prepackaged Grout for Post-tensioned Ducts.*

1. Water. The water used in the grout shall conform to subsection 712.01.
2. Shall meet the requirements of subsection 618.09(b). Grout.

(b) *Steel and Metal for Prestress Members.* All steel and metal products incorporated into the work shall meet the requirements of Section 106. The Contractor shall keep Certified Mill Test Reports (CMTR's) on file for all steel and metal products used, and shall furnish copies of CMTR's when requested.

Galvanizing and metallizing of steel products shall be done in accordance with the product applicable ASTM method. The product shall be galvanized after welding and fabrication is complete. Minor repair of galvanizing shall be brush coated with an approved zinc-rich compound that is acceptable to the QA Representative.

Materials and fabrication procedures shall conform to ASTM or ANSI / AWS requirements. The materials and work shall conform to the following requirements and specifications, unless otherwise indicated in the Contract.

1. Reinforcing Bars. All reinforcing bar material shall be Grade 60 minimum and shall conform to ASTM A 615, or ASTM A 706; epoxy coated bars shall also meet ASTM D 3963. Reinforcing bars that require welding shall conform to ASTM A 706. Welding of A 706 bars shall be done in accordance with ANSI /AWS D.1.4.

2. Welded Wire Reinforcement. Steel welded wire reinforcement for concrete reinforcement shall conform to ASTM A497.

3. Plate Steel. All plate steel shall conform to ASTM A 709 Grade 36 specifications. Fabrication and welding of plate steel products shall be done according to ANSI / AWS D.1.1.

4. Steel and metal products shall be free of loose rust and foreign substances before incorporation into the cast product.

   The presence of rust on strand shall not necessarily be cause for rejection. Light rust and rust that does not result in visible pitting of the prestressing steel with the unaided eye shall be acceptable. Prior to evaluation rust shall be removed from representative lengths of prestressing strand by heavy duty scouring pads or wire brush. After rust removal, visual comparisions shall be made to picture sets in the article "Evaluation of Degree of Rusting on Prestressed Concrete Strand" published in the 1992 May-June edition of the PCI Journal. Surface conditions comparable to picture sets 1 through 3 shall be acceptable, while conditions comparable to picture sets 4 and greater shall be cause for rejection of the prestressing strand.

(c) *Concrete for Pretensioned and Combination Tensioned Products.* Materials for Concrete class PS shall meet the requirements specified in the following subsections:

| | |
|---|---|
| Hydraulic Cement | 701.01 |
| Fly Ash | 701.02 |
| Fine Aggregate | 703.01 |
| Coarse Aggregate | 703.02 |
| Curing Materials | 711.01 |
| Air Entraining Admixtures | 711.02 |
| Chemical Admixtures | 711.03 |
| Water | 712.01 |

(d) *Concrete and Steel for Other Members.* Concrete for other members shall conform to the requirements of Section 601 and the plans. Reinforcing steel for other members shall conform to the requirements of Section 602.

**CONSTRUCTION REQUIREMENTS**

**618.03 Prestressed Members.** Members may be pretensioned, post-tensioned, or a combination of pretensioned and post-tensioned. Members shall be fabricated and finished as shown in the Contract.

Minimum cover for prestressing steel shall be 1½ inches, unless otherwise shown in the Contract. Minimum clearance for reinforcing steel shall be 1 inch unless otherwise shown in the Contract.

If the plans show only pretensioning details, use of a post-tensioning system will be allowed only if complete details of all necessary modifications are approved by the Engineer of Record.

Cast-in-place members shall be post-tensioned unless otherwise shown on the plans. All falsework for cast-in-place members shall remain in place until all post-tensioning and grouting has been completed and accepted by the Engineer.

**618.04 Shop Drawings.**

(a) *General.* The Contractor shall furnish shop drawings in conformity with subsection 105.02 for all prestressed components. When the Contractor's Engineer completes or revises design details or engineering drawings, then those engineering drawings and details that are submitted to the Engineer shall contain the endorsement seal of a Professional Engineer registered in the State of Colorado. CDOT review of the shop drawings does not relieve the Contractor of the responsibility for the adequacy of the prestressed members. Minor changes to design details or engineering drawings that do not represent a significant change to the original design will not require a

Professional Engineer seal. The Contractor shall submit supporting calculations for these changes along with the shop drawings

(b) *Pretensioned Members.* The shop drawings shall include the following:

(1) Superstructure Framing Plan.
(2) All unit dimensions.
(3) Location and arrangement of prestressing strands.
(4) Initial and final jacking forces.
(5) Location, description, and detail of structural reinforcing items, excluding minor items used for field erection.
(6) Location of all hold-down devices.
(7) Location and description of all plates.
(8) Provisions for diaphragm connections.
(9) Blockout and keyway dimensions, if any.
(10) Location and detail of debonded strands.
(11) Strand de-tensioning sequence.

(c) *Post-tensioned Members.* The shop drawings for post-tensioned members shall show the following:

(1) Strand and bar properties, including material type, modulus of elasticity, ultimate strength, diameter, and cross-sectional area assumed in the design.
(2) Duct properties, including material type, and minimum inside and maximum outside diameters, and friction coefficients of the duct-strand system if different from shown on the plans.
(3) The position and profile of the ducts and tendons along the length of the member. Each duct position shall be defined at tenth points along the length of the member. The minimum clearance from the edge of concrete to the edge of a duct shall be shown.
(4) Location of closure pours and associated duct splices and details of duct splice, including the details and specifications of the shrink sleeve material.
(5) The maximum offset between the center of the duct and the center of force in the duct for each unique strand and bar and duct combination. The resultant force of all permanent tendons in the member shall match the profile indicated on the plans.
(6) The initial and final force at each anchorage. The initial force is defined as the largest force at each anchorage before anchor set and after friction losses. The final force is defined as the residual force remaining after anchor set and long term losses.
(7) Complete dimensions and properties necessary to fabricate and install each unique anchorage device, including the type of materials, yield strengths, distribution plates, wedges, trumpets, anchorage blocks, and other appurtenant items. Adjacent reinforcement shall be detailed showing how it will coordinate with the anchorage device and its reinforcement.
(8) The dimensions and properties necessary to fabricate and install the bursting, splitting, and other reinforcement required by the prestressing system, as shown on the plans or as proposed by the Contractor. Included shall be cross-sectional areas, yield strength, the location of the reinforcement, and the diameter and pitch of the spirals. If no additional bursting steel is required, it shall be so stated on the shop drawings.
(9) The minimum length of strand or bar projection at the live ends and accessible dead ends.
(10) The preload force for each unique tendon. The preload force is defined as 20 percent of the jacking force.
(11) The required total jacking force for each unique tendon.
(12) The total final elongation, after dead and live end anchor sets, and the measurable elongation for each tendon. The measurable elongation is defined as the total elongation at

the live end after preload while the stressing equipment is tensioning the tendon to the total jacking force. The tendon length used for calculations shall include the full length of strand that is being stressed.

(13) The sequence of stressing, including temporary and permanent post-tensioning.

(14) Blockout or buildout concrete dimensions and reinforcement details.

(15) If the Contractor elects to submit an alternative system, as defined in subsection 618.07(c), the Contractor shall also provide the following, as appropriate.

If the anchorage device will differ from what is shown on the plans, the Contractor shall submit calculations or manufacturer test certification consistent with the Contract. The calculations shall show the complete design of the anchorage device, including splitting steel, bursting reinforcement, the distribution plate, and the bearing stresses transmitted to the concrete by the anchorage device. The manufacturer's test certification shall certify the adequacy of the anchorage device. The shop drawings shall reflect the anchorage device design.

If the flare of the tendons is different from what is shown on the plans, the Contractor shall submit design and details of appropriate reinforcement and concrete dimensions to accommodate the flare.

Along with the shop drawing details, six copies of computations for friction losses, calculated measurable elongations, the maximum offset between the center of force and center of duct for each unique tendon, and the stressing sequence shall be submitted for review. The friction losses shall be determined in accordance with the plans and as provided for in the current"AASHTO LRFD Bridge Design Specifications."

(d.) For Combination Tensioned Members refer to 618.04 (b) and (c).

**618.05 Notification of Fabrication for Pretensioned and Combination Tensioned Members.**

(a) *Start of Work.* Prior to beginning the work, the Contractor shall provide notice to the Engineer and the Quality Assurance (QA) Representative, as defined in subsection 618.06(a), so that QA services may be provided. The notice shall be at least seven days before fabrication begins.

The anticipated production schedule, including the start of work, phase work and shipment dates shall be submitted in writing to the QA Representative before any work begins. Fabrication shall not be started until the shop drawings have been returned with the Engineer's review stamp, indicating Reviewed, no exception taken; or Reviewed, revise as noted; or Resubmit, revise as noted in accordance with subsection 105.02, and delivered to the Contractor's site of fabrication.

(b) *Production Schedule Changes.* Accelerated changes to the proposed production schedule, including start of work, phase work, and shipment dates, shall require advance written notification be provided to the Engineer and the QA Representative. The written notice of change shall be received at least 48 hours before fabrication begins, unless otherwise approved in writing by the Engineer or the QA Representative.

(c) *Notice of Shipment.* The QA Representative shall be notified in writing, at least 72 hours before shipment of prestressed members to the job site.

(d) *Notification.* Failure to notify the Engineer or the designated QA Representative as described in this section may be cause for rejection.

**618.06 Inspection of Pretensioned, Post-tensioned and Combination Tensioned Members.**

(a) *Quality Control and Quality Assurance*. Quality Control (QC) of prestressed concrete fabrication is the responsibility of the Contractor. The Contractor shall designate a QC Manager who shall be responsible for product quality requirements as defined in the specifications and the Contractor's approved QC plan (QCP). The QC Manager shall possess and maintain certification at Level II minimum, from the Prestressed Concrete Institute (PCI), or be a licensed Professional Engineer in the State of Colorado, and shall have one year minimum of construction related experience. The QC Manager shall not be supervised by the Contractor's production section. If grouting for post-tensioning ducts of combination tensioned members is done by the precast girder fabricator,

the QC Manager shall possess and maintain an American Segmental Bridge Institute (ASBI) Certified Grouting Technician Certificate. If prestressing, duct and anchorage installation,inspection of duct and anchorage stressing of tendons, air testing of ducts, or grouting of ducts of multi-strand bonded tendons of the post-tensioning system for combination tensioned members is done by the precast girder fabricator the QC Manager shall possess a PTI Level I – Bonded Tendon Training Certificate.

Quality Assurance (QA) and product acceptance are the prerogatives of the Engineer. The QA Representative acts for and in behalf of the Engineer on all matters within the scope of the contract documents, as delegated by the Engineer. QA administration will be performed to the extent necessary to assure contract compliance. The QA Representative shall possess the American Segmental Bridge Institute Grouting Certification Training.

Repeated out of tolerance work, including dimensional non-conformance, shall be considered as recurring deficiencies. Recurring deficiencies shall be considered as evidence that required QC is not being provided. When the QA Representative determines that fabrication operations are producing recurring defects that do not conform to the Contract and the QCP requirements, the Contractor will be notified that the present work is unacceptable. Work shall not continue until the QC Manager has submitted a written proposal addressing corrective procedures that the Contractor will take to prevent recurrence of the non-conforming work. Fabrication shall not resume until the proposal has been reviewed and accepted in writing by the QA Representative.

(b) *Quality Control Plan (QCP).* The Contractor shall submit a written QCP to the QA Representative prior to the beginning of fabrication. The QCP shall be reviewed and approved in writing by the Contractor's QC Manager. The QCP shall list all methods utilized by the Contractor to ensure that the work conforms to contract requirements. The QC section is responsible for establishing the QCP, as well as conformance to the QCP. Fabrication shall not begin until the QCP has been reviewed and accepted in writing by the QA Representative.

If work methods for a specific project or product are not listed in the original QCP, the Contractor shall submit written addenda addressing the proposed methods that are necessary to meet contract requirements. Fabrication shall not begin until the addenda have been reviewed and accepted in writing by the QA Representative.

The QCP shall address the following:

(1) Names and qualifications of the QC Manager and personnel conducting inspection and testing. This list shall be updated when changes in personnel occur.

(2) List of material suppliers, post-tensioning system supplier, post-tensioning grout supplier and certified testing agencies used; the list shall be updated when vendors change.

(3) Materials sampling and testing schedule, showing testing methods and frequencies.

(4) QC inspection methods and procedures for all stages of fabrication operations.

(5) Methods for curing products and test specimens.

(6) Method and sequence for tensioning strands, including methods used for verifying equal distribution of jacking forces.

(7) Method and sequence of de-tensioning strands and procedure.

(8) Post-tensioning system. The responsible representative meeting the requirements of subsection 618.06(b)(8) shall possess an “American Segmental Bridge Institute (ASBI) Certified Grouting Technician” certificate and a PTI Level 1 – Bonded Tendon Training certificate. Duct and anchorage inspection schedule, duct splices at closure pour inspection schedule, and onsite duct air pressure testing schedule, including name(s) of the responsible representatives who will conduct inspections and testing.

(9) Written report format for materials sampling, testing, and inspection for all phases of the work.

(10) Copies of all concrete mix designs to be used, including mix design computations and test data.

(11) Provisions for fabrication operations during cold, windy, or hot weather conditions.

(12) Procedures for patching small production holes and holes left by strand hold-down devices.

(13) Procedures for identifying, evaluating and reporting defects, including dimensional non-conformance, discovered during QC/QA inspections and testing.

(14) Procedures for notifying the QA Representative of structural defects, and submittal of written proposal for repairs.

(15) Provisions for contingency operation when concrete delivery is interrupted due to malfunction of equipment during fabrication.

(c) *Frequency.* QC inspection and testing at all intervals of duct and anchorage placement, duct splices at closure pours , onsite duct air pressure tests and forming, tensioning, steel and concrete placement, curing, and storage operations shall be performed in accordance with the accepted QCP. The QCP shall contain provisions for increased frequencies of inspection and testing when operations or products do not conform to the Contract.

(d) *Written Records and Reports*. The QC Manager shall review and submit the following completed records and reports to the QA Representative before the product receives acceptance by the QC section:

1. Prestressing Steel - Tensioning reports for each setup, showing the jacking force calculations; initial and final jacking force used; calculated and final net measured elongation; applicable stressing corrections for seating, slippage, shortening, rotation movement, and temperature; Certified Mill Test Reports for prestressing steel used; jack identification number, date and time of stressing.

2. Concrete - A daily report of each mix design used, showing the fresh concrete slump, temperature, unit weight, and air content (if specified). The daily report shall also include the following data:

   (1) date and time of casting
   (2) bed and setup location
   (3) ambient conditions
   (4) total cubic yards placed
   (5) girder mark and unique sub-mark identifications
   (6) actual product curing temperature charts or graphs
   (7) actual curing enclosure humidity charts or graphs
   (8) average release strength in psi
   (9) date and time of release strength
   (10) copies of individual batch tickets when requested by the QA Representative

3. Pre-pour Inspection Records shall include the items to be checked as listed in the QCP.

4. Post-pour Inspection Records shall include the items to be checked as listed in the QCP. These records shall include all discovered variances from product dimensional tolerances.

5. Report of minor repairs made to each individual product.

6. The following written records shall be submitted to the QA Representative before product shipment:

   (1) Elastomeric Bearing Pads - Product manufacturer's certification and supplier's letter of compliance.
   (2) Length measurement of beams within three days prior to shipping.
   (3) Product camber measurement within seven days prior to shipping.

7. Steel and Metal. For reinforcing bars, welded wire reinforcement, plate steel, and miscellaneous steel and metal products incorporated into the work, QC Manager shall review and maintain all certified mill test reports (CMTRs). QC Manager shall certify in writing that all steel and metal products comply with the Contract. When requested, QC Manager shall

furnish copies of CMTRs to the QA Representative.

8. Post-tensioning Ducts. The responsible representative meeting the requirements of subsection 618.06 (b)(8) shall submit to the QA Representative a letter certifying that the ducts, duct splices, and anchorages are installed according to the Contract and that they have been inspected by the responsible representative of the post-tensioning system supplier and adequately held an air pressure after stressing and before grouting.

   After stressing and before grouting, install all grout caps, inlets and outlets and test the duct with compressed air to determine if duct connections require repair. In the presence of the Engineer, pressurize the duct to 30 psi and lock-off the outside air source. Record pressure loss for one minute. A pressure loss of 15 psi is acceptable for ducts having a length equal to or less than 150 feet and a pressure loss of 9 psi is acceptable for ducts longer than 150 feet. If the pressure loss exceeds the allowable, repair leaking locations using methods approved by the Engineer and retest.

**618.07 Fabrication.**

(a) *Pretensioning - General.* Prestressing shall be done with calibrated jacking equipment that conforms to the requirements of subsection 618.10. Strands shall be tensioned in accordance with the approved sequence as indicated in the QCP. All indicating dials shall be at least 6 inches in diameter; calibrated digital display equipment is also acceptable.

The stressing sheet shall show the measurements, factors and computations for tension and elongation, including all stressing corrections; if these factors are not shown on the stressing sheet, they must be submitted with the shop drawing and calculation index. The applicable stressing corrections shall be applied at the time of final stressing. Before using any stressing correction for friction, the need for corrections shall be proven by load cell or dynamometer checks at both ends of the setup. Temporary overstressing shall not exceed 80 percent of the minimum ultimate tensile strength of the prestressing steel. Tensioned strands shall not be seated during temporary overstressing.

Tensioned strands shall maintain vertical and horizontal position, within allowable tolerances, as specified in subsection 618.14(b), throughout the entire length of the member; intermediate strand supports shall be used if the tolerances cannot be maintained. Tensioned strands shall not be entangled or intertwined with other strands, except for draped strands in the bundled area between hold down devices.

A QC employee shall witness and verify final tensioning operations and record the jacking forces and the net measured elongations. Jacking force shall be recorded to the nearest 100 pound increment used. Net elongation shall be measured to the nearest ⅛ inch. Tensioning operations shall also meet the following requirements:

1. Initial tensioning shall not exceed 20 percent of the jacking force.
2. Tension load readings shall be taken from pressure gages, dynamometers or load cells. If pressure gages or dynamometers are used, the applied load shall register between 20 and 80 percent of the total reading capacity of the system. If load cells are used, the applied load shall register between 10 and 90 percent of the total load cell capacity. If a master gage system is used, a current certified calibrated graph or table correlating actual loads with the master gage readings, shall be given to the QA Representative.
3. The jacking force applied shall be within plus or minus 5 percent of the design jacking force. The net measured elongation shall be within plus or minus 5 percent of the calculated elongation; if net measured elongation is not within tolerance, the strand shall be stressed from both ends. The algebraic comparison of the variation between the jacking force and the net measured elongation shall agree within plus or minus 7 percent. If these three tolerances are not achieved, tensioning operations shall cease; all stressing deficiencies shall be corrected before regular tensioning operations resume.
4. If any wire or wires in a 7-wire strand breaks, whether or not that strand shall be removed and replaced shall be determined based on whether forces are within tolerances as specified in

subsection 618.07(a)(3) and by referring to PCI MNL 116 5.2.6.

5. Strand or spliced strand that exhibits unraveling after stressing, shall be removed and replaced with a sound strand. Strand splices shall not fall within the member to be cast.

6. Strands that have received final tension shall be protected from temperature fluctuations greater than 40 °F until the time of concrete placement. The Contractor may apply stress corrections at the rate of 1 percent per 11 °F, for temperature variation between final tensioning and concrete placement. This requirement does not apply to self-stressing bed setups. The total stressing force applied shall not exceed 80 percent of the minimum ultimate tensile strength of the prestressing steel.

7. Tensioned prestressing steel shall be free from dirt, mud, ice, snow build up, oil, grease, paint, loose rust, and all other bond inhibiting substances prior to concrete placement. Visibly pitted strand shall not be used.

8. Draped Strand - Final stressing shall be accomplished by any of the methods described below:

   A. Jacking in Draped Position. Final stressing shall begin at one end of the bed. Strands that do not meet the tension vs. elongation tolerances shall be jacked from the other end so that all tolerances are achieved. If all draped strands conform to tolerances after jacking at one end, the jacking force shall be verified on at least two strands at the opposite end.

   B. Partial Stressing and Subsequent Strain. Initial and partial stress may be induced from either end of the bed. Final stress shall be attained by lifting or depressing the strands to the design location. Final stress and strain shall be applied in such a manner that uniform distribution of jacking force is attained throughout the bed setup and, all tension vs. elongation tolerances have been achieved. The distribution of force shall be verified on at least two strands at the opposite end.

   C. Stage Tensioning. Initial tensioning shall be done from one end. Partial tensioning may then be performed from either end. When final stressing is completed, the sum of the partial elongations shall be used to verify that all tension vs. elongation tolerances have been achieved. This method may also be used for tensioning of straight strands.

9. Hold-down devices shall be placed within a 20 inch horizontal tolerance from the locations shown on the contract drawings if placement is moved toward the center of girder and within a 40 inch horizontal tolerance from the locations shown on the contract drawings if placement is moved toward the girder ends; if minimum or maximum placement locations are shown on the contract drawings, the placement tolerances shall not encroach beyond those locations.

   The hold-down device shall not encumber or displace adjacent straight strands out of tolerance; and shall not produce nicking of any drape or bundled strands. The device shall secure the draped or bundled stands in the positions shown on the shop drawings, within all tolerances required by subsection 618.14(b).

(b) *Combination Tensioned Members*. Pretensioning of combination members shall be performed in accordance with subsection 618.07(a). All post-tensioning operations shall conform to subsection 618.07(c)

(c) *Post-tensioning Method.*

1. Bonded Post-tensioning and Grouting Systems Review. Upon review of the shop drawings, the Engineer will schedule a meeting with the Contractor to review the post-tensioning and grouting procedures to be used on the project. The following individuals shall be in attendance at this meeting:

   (1) The Engineer and QA Representative.

   (2) The Contractor's Superintendent.

   (3) The post-tensioning system supplier. This individual shall have the following qualifications:

(i) A Professional Engineer registered in the State of Colorado.

(ii) Knowledgeable in the analysis of post-tensioned structures, the design required for shop drawing development, field calculations for revising tendon elongations from the assumed parameters to the actual strand area and modulus used on the project as determined by tests conducted on the strand by CDOT, and stressing of tendons.

(iii) A holder of a current Certified Grout Technician Certificate from the American Segmental Bridge Institute (ASBI).

(iv) Able to be present during all tendon stressing and grouting to keep written records of these operations for submittal to the Engineer for review.

(4) A grout manufacturer's field representative who is a full-time employee of the grout manufacturer, will provide technical product assistance to the grouting crew, and shall be present during start-up of grouting operations and shall be able to be present at the request of the Engineer should problems with the grout occur.

(5) The Contractor's designee who will be in direct charge of the post-tensioning and grouting crews. This individual shall have the following qualifications:

(i) Be skilled in the use of the post-tensioning and grouting equipment.

(ii) Have at least three years experience on previous projects supervising the post-tensioning and grouting of structures of similar type and magnitude.

(iii) Present on the project during the installation of the post-tensioning system, stressing operations, and grouting operations.

(6) Contractor's QC Manager.

(7) Other individuals as deemed necessary by the Contractor or Engineer.

Ten days prior to the Post-Tensioning and Grouting System Review meeting, the Contractor shall submit a written plan for grouting the ducts. Grouting shall not begin until the Engineer has provided written approval of the grouting plan. The grouting plan shall provide at least the following information:

(1) The name, training, and experience records of the person supervising the grouting operations.

(2) Other individuals as deemed necessary by the Contractor or Engineer.

(3) Name of the grout material and the required certifications and test results.

(4) Manufacturer and type of grout mixer and pump to be used, including provisions for back-up equipment and spare parts.

(5) Grouting procedure and the role of each person on the crew.

(6) Theoretical grout volume calculations.

(7) Method for closing all duct orifices as grouting progresses.

(8) Air testing of ducts.

(9) Grout mixing and pumping procedures.

(10) Location of grout inlet and direction of pumping.

(11) Procedures for handling blockages, procedures and equipment required for flushing ducts of grout if necessary, and how and when it will be decided whether or not to flush ducts.

(12) Methods to inspect behind anchorages, grout inlets and outlets, and vents for voids.

(13) List of production testing along with acceptable values according to Table 618-1.

(14) Acceptable specific gravities for mud balance test provided by the grout manufacturer.

(15) Procedures for post grouting repair of all grout voids detected.

(16) Procedure for installing corrosion inhibitor inside tendons if necessary.

2. Alternative Post-tensioning Systems. The Contractor may choose to supply the design and details of the prestressing system shown on the plans or submit an alternative for approval. The following alternatives may be presented to the Engineer for his review and approval:

(1) Alternative anchorage systems. Alternative anchorage systems, including all associated anchor zone reinforcing steel associated with the alternative anchorage system, and all details of the alternative anchorage system shall be shown on approved shop drawings and stamped by a Professional Engineer registered in the State of Colorado and who is an employee of the post-tensioning system supplier or anchorage supplier.

(2) Alternative number or sizes of ducts. The duct pattern must conform to an acceptable pattern as indicated on the plans.

(3) Alternative jacking ends.

(4) Alternative number of strands, provided the minimum area of steel and the center of force matches that indicated on the plans.

(5) Alternative duct type, friction coefficients, or anchor set.

The stressing sequence, details, or procedures shall not differ from what is called for on the plans, such that it would cause a change in the jacking force times initial stress ratios at the critical points identified on the plans, beyond an acceptable tolerance of 0 to +5 percent.

If the Contractor elects to submit alternative details, the alternative details shall conform to the following:

(1) The final center of force shall match that as indicated on the plans.

(2) If the plans call for a tendon to be composed of a certain number of strands, the Contractor's alternative shall have that same tendon composed of the same number of strands.

(3) If the plans call for a tendon to be composed of bars, the Contractor's alternative shall have that same tendon composed of bars.

(4) If the plans call for ducts and tendons internal to the member, the Contractor's alternative shall also have internal ducts. Similarly, if the plans call for ducts and tendons external to the member, then the Contractor's alternative shall also have external ducts.

(5) The alternative shall include details or calculations supporting the adequacy of the Contractor's alternative as specified in the shop drawing and calculation requirements of this specification.

(6) Bridge cross-sectional geometries, dimensions, and clearances shall match those indicated on the plans, with the exception of girder flares near anchorages.

3. Duct Fabrication and Placement. Duct enclosures for prestressing steel shall be either rigid corrugated plastic or galvanized, corrugated, rigid ferrous metal.

Metal ducts shall be fabricated with either welded or interlocked seams. Galvanizing of the welded seams for metal ducts will not be required.

The ducts shall be mortar tight and accurately placed within ½ inch of the positions shown on the approved shop drawings. Ducts shall be securely fastened to maintain their correct alignment during placing of concrete. Joints between sections of duct shall be positive rigid connections which do not result in angle changes at the joints. Waterproof tape shall be used at the connections. Ducts shall be bent without crimping or flattening. Transition couplings connecting ducts to anchoring devices need not be galvanized. Ducts shall be free of kinks. All changes of direction shall have a radius of 20 feet, unless otherwise shown on the plans. Shrink sleeves at duct splices at closure pours shall be used.

The duct area shall be at least twice the net area of the prestressing steel for tendons composed of multiple wires, bars, or strands.

The duct diameter shall be at least ¼ inch larger than the nominal diameter of the wire, bar, or strand for tendons made up of a single wire, bar, or strand.

All ducts shall have grout openings at each end. Grout vents shall be provided at all high points and low points of draped tendons. In addition, at draped tendon high points,

secondary high point gout vents shall be located three feet beyond all high points in the direction that the grout will be pumped.

Grout openings and vents shall be securely fastened to the ducts and forms or reinforcing steel to prevent displacement while placing concrete. The vents shall be mortar tight, taped as necessary and shall provide means for injection of grout. Ends of grout vents shall be removed to 1 inch inside the face of concrete surface after the grouting has been completed and the holes filled with an approved epoxy or non-shrink grout and finished smooth.

Prior to installation of the prestressing steel, the Contractor shall show that the ducts are free from debris and water. For ducts which are internal to the member, the Contractor shall show that the ducts are free from any blockage or damage from the concrete placing operations. The Contractor shall do this immediately after the concrete encasing the duct has achieved initial set. The precast fabricator shall be responsible for the condition of the ducts during fabrication if the member is precast.

The precast fabricator shall demonstrate to the QA Representative that the ducts are free and clear of any obstructions or damage and are able to accept the intended post-tensioning tendons by passing a torpedo through the ducts. A torpedo of the same cross-sectional shape as the duct that is 1/8 inch smaller all around than the clear, nominal inside dimension of the duct. No deductions shall be made to the torpedo section dimensions allowed in the manufacture or fixing of the ducts. For curved ducts the length shall be determined so that when both ends of the torpedo touch the outermost wall of the duct, the torpedo is 1/8 inch clear of the innermost wall. Acceptance shall be based on the torpedo passing through the duct easily. Nonconformance is when the torpedo does not pass through the ducts easily and shall be addressed per 618.13.

Once installed, the ducts (including the ends of the ducts at the anchorages, grout ports, and duct vents) shall be sealed immediately to prevent the entry of water or other debris until the tendons are grouted.

The use of water soluble oil in the ducts and flushing the ducts with water will not be allowed.

4. Post-tensioning Equipment and Procedure.

Installing Tendons. Excess water in ducts shall be removed by blowing oil-free compressed air through the ducts.

Post-tensioning strands to make up tendon shall be pushed or pulled through the ducts using methods which will not snag on any lips or joints in the ducts.

The ends of strands which are pushed through the duct shall be rounded off or fitted with a smooth protective cap. Strand that is pushed shall not be intentionally rotated by any mechanical device during the installation of the post-tensioning into the duct.

The ends of strands which are pulled through the duct shall be assembled to form the tendon and pulled using a special steel wire sock (“Chinese finger”) or other device attached to the end. The ends of the strands may be electric arc welded together for this purpose as long as at least 1 foot to 5 ft of the strands from the welded end, depending on size of tendon, is removed after installation. The ends of strands of the pre-assembled tendon shall be rounded to facilitate smooth passage through the duct.

Cut strands using an abrasive saw or equal. Flame cutting or plasma cutting of strands is allowed only with permission from the Engineer.

The responsible representative shall be present at all times during stressing of bonded post-tensioned members.

Tensioning shall be done with approved jacking equipment. Hydraulic jacks shall be equipped with accurate pressure gauges at least 6 inches in diameter. The combination of jack and gauge shall have been calibrated within the last 12 months, in accordance with subsection 618.10(a). A certified calibration chart, graph, or table showing this calibration of the jack and gauge combination shall be furnished to the Engineer. The range of calibrations shall

encompass the range of required forces indicated on the shop plans. The jacking equipment shall be capable of simultaneously stressing all wires, strands, or bars for each individual tendon.

Tendons shall be stressed in accordance with the sequence as indicated on the approved shop drawings. If the Contractor chooses to deviate from the sequence, the Contractor shall resubmit the shop drawings for approval. The sequence shall not cause stresses in excess of the maximum allowable stresses shown on the plans.

Tendons shall be preloaded to 20 percent of their total jacking force, before measuring elongations.

Measured elongations shall be within ± 7 percent of the calculated values, unless otherwise approved by the Engineer.

A broken or damaged strand is cause for rejection of the tendon. If a strand is rejected, the remaining strands in the tendon will be evaluated by the Engineer for reuse.

Where dead end anchorages and tendons are accessible, the anchorage system and length of projecting prestressing steel shall permit jacking with the same jacking equipment that was used on the live end.

Tendon projections at the live end and accessible dead ends shall not be cut off until all post-tensioning is completed and accepted.

The representative of the post-tensioning system supplier shall keep a record of the following items for each tendon installed and provide a copy to the Engineer the day stressing is completed:

(1) Project name and number.
(2) Contractor and subcontractor.
(3) Tendon location, strand diameter, and number of strands.
(4) Date strand was first installed in the ducts.
(5) Heat number of the strands.
(6) Assumed and actual strand cross-sectional area and modulus of elasticity.
(7) Date stressed.
(8) Date of calibration of the jack and pressure gauge combination with their identification numbers.
(9) Required initial and final jacking force and the gauge pressure.
(10) Anticipated and actual elongations and anchor set.
(11) All deviations from the plans, specifications, and approved shop drawings shall be brought to the attention of the Engineer for immediate resolution.

**618.08 Post-Tensioning Anchorages and Distribution.** Prestressing steel shall be secured at the ends by means of approved permanent type anchoring devices.

Anchorages and couplers shall develop at least 95 percent of the minimum specified ultimate strength of the prestressing steel. The coupling of tendons shall not reduce the elongation at rupture below the requirements of the tendon itself. Couplers and coupler components shall be enclosed in housings long enough to permit necessary movements. Couplers for tendons shall be used only at locations specifically indicated or approved by the Engineer.

Couplers shall not be used at points of sharp tendon curvature.

Permanent anchorage grout caps are required and shall be installed before grouting begins.

Anchorage devices shall have a minimum clear concrete or grout coverage of 2 inches in every direction. Alternative corrosion protection methods for anchorages shall be shown on the shop drawings submitted by the Contractor.

The prestressing force shall be effectively distributed to the concrete by means of an approved anchoring device. Such devices shall conform to the following requirements:

(1) The average concrete bearing stresses on the concrete-created anchorage distribution plates shall not exceed the values allowed by the following equations:

During jacking:

$$f_{cp} = 0.8 f'_{ci} \sqrt{\frac{A'_b}{A_b} - 0.2} \leq 1.25 f'_{ci}$$

After jacking:

$$f_{cp} = 0.6 f'_{ci} \sqrt{\frac{A'_b}{A_b} - 0.2} \leq 1.25 f'_{c}$$

Where:

| | | |
|---|---|---|
| $f_{cp}$ | = | permissible compressive concrete stress |
| $f'_{ci}$ | = | compressive strength of concrete at time of jacking |
| $f'_c$ | = | compressive strength of concrete |
| $A'_b$ | = | maximum area of the portion of the concrete anchorage surface that is geometrically similar to and concentric with the area of the anchorage |
| $A_b$ | = | bearing of the anchorage |

If bursting steel is not used, the peak bearing pressure on the concrete at the time of jacking from the distribution plate shall not exceed 0.90 $f'_{ci}$. If the distribution plate or anchorage device is within 4 inches of any concrete edge or corner or another distribution plate or anchorage device, the pressure on the concrete shall not exceed 0.70 $f'_{ci}$. Construction joints shall not pass under distribution plates or anchors.

(2) Bending moments in the plates or assemblies induced by the pull of the prestressing steel shall not exceed the plastic strength of the material or cause visible distortion of the distribution plate when 100 percent of the ultimate prestress load is applied as determined by the Engineer.

(3) Distribution plates may be omitted if the anchorage device distributes the stresses in the concrete consistent with these specifications, and provided that this anchorage device is used in conjunction with embedded bursting and splitting reinforcement.

**618.09 Bonding and Grouting.**

(a) *General.* Post-tensioned prestressing steel shall be bonded by completely filling the void space within a duct with grout. Prestressing steel to be bonded shall be free of dirt, loose rust, or other deleterious substances. The ducts shall be kept free of water, dirt, or other deleterious foreign materials that will inhibit bond until the tendons are grouted. Time from installing the prestressing steel in the ducts in an unstressed condition to grouting after stressing shall not exceed thirty days. If a corrosion inhibitor, as specified below, is used on the strands in the ducts, the time limit shall not exceed sixty days. Grouting shall proceed as soon as possible after stressing of the prestressing steel in the ducts. If a corrosion inhibitor is used on the strands in the ducts, it shall be applied after post-tensioning is completed and accepted and grouting accessories are installed so that tendons are sealed. The post-tensioning system installer shall submit an installation log. A copy of the log that documents the day the strands were installed within the duct and the corrosion inhibitor applied to the strands in the duct, with the duct given an identification easily referenced to the plans, shall be provided to the Engineer. All pertinent product numbers, the brand and the corrosion inhibitor type shall be documented in the log. Verfication shall be made weekly that the tendons remain sealed and grout vents, drains and caps have not been damaged.

(b) *Grout.* Grout shall be prepackaged in bags.

The following information shall be printed on the grout bags: product name, name of the

producer, date of packaging, lot number, and mixing instructions.

Grout shall not contain any lumps or other evidence of hydration.

The grout shall not contain aluminum powder or compounds, which will produce hydrogen gas, carbon dioxide, or oxygen. In addition, the grout shall not contain fluorides, sulphites, nitrates,, or acid-soluble chloride ions which exceed 0.08 percent by weight of the cementitious materials. The Contractor shall provide the Engineer with written certification from the grout manufacturer that the grout does not contain or produce these elements or compounds with the grouting plan.

The grout shall conform to the following Standard and Modified ASTM Tests in Table 618-1 when mixed in accordance with the manufacturer's instructions:

**Table 618-1**

| Property | Test Value | Test Method |
|---|---|---|
| Total Chloride Ions | Max. 0.08% by weight of Cementitious material | ASTM C 1152 |
| Fine Aggregate (If utilized) | Max. Size: 300 µm (No. 50 Sieve) | ASTM C 33 |
| Volume Change at 24 hours and 28 days | 0.0% to + 0.3% | ASTM C 1090 [1] |
| Expansion | 0.0%(minimum) 2%(maximum) for up to 3 hours | ASTM C 940 |
| Compressive Strength at 28 days (Average of 3 cubes) | 7,000 psi minimum | ASTM C 942 |
| Initial set of the grout | 3 hours minimum 12 hours maximum | ASTM C 953 |
| Bleeding at 3 hours | Maximum 0.0 % | ASTM C 940 [4] |
| Permeability at 28 days | Maximum 2500 coulombs At 30 Volts for 6 hours | ASTM C 1202 |
| **FLUIDITY TEST** [2] | | |
| | **Efflux Time from Flow Cone** | **ASTM Method** |
| (a) Immediately after mixing | 11 Seconds Minimum 30 Seconds Maximum OR 5 Seconds Minimum 30 Seconds Maximum | ASTM C 939 ASTM C 939 [3] |
| (b) 30 minutes after mixing with remixing for 30 seconds | 30 Seconds Maximum OR 30 Seconds Maximum | ASTM C939 ASTM C 939 [3] |

**Table 618-1 and footnotes continued on next page.**

**Footnotes for Table 618-1**

[1] ASTM C 1090 shall be modified to include verification at both 24 hours and 28 days.

[2] Adjustments to flow rates shall be achieved by strict compliance with the manufacturer's recommendations.

[3] Grout fluidity shall meet either the Standard ASTM C 939 flow cone test or the Modified Test described herein. Modify the ASTM C 939 Test by filling the cone to the top instead of to the standard level. The efflux time is the time to fill a one liter container placed directly under the flow cone.

[4] ASTM C 940 shall be modified to conform with the wick induced bleed test as follows:

(i) Use a wick made of a 20 inch length of ASTM A 416 seven wire 0.5 inch diameter strand. Wrap the strand with two inch wide duct or electrical tape at each end prior to cutting to avoid splaying to the wires when it is cut. Degrease (with acetone or hexane solvent) and wire brush to remove any surface rust on the strand before temperature conditioning.

(ii) Condition the dry ingredients, mixing water, prestressing strand and test apparatus overnight to 65 to 75 °F.

(iii) Mix the conditioned dry ingredients with the conditioned mixing water and place 800 ml of the resulting grout into the 1,000 ml cylinder. Measure and record the level of the top of the grout.

(iv) Completely insert the strand into the graduated cylinder. Center and fasten the strand so it remains essentially parallel to the vertical axis of the cylinder. Measure and record the level of the top of the grout.

(v) Store the mixed grout at the temperature range listed in (ii).

(vi) Measure the level of the bleed water every 15 minutes for the first hour and hourly for two successive readings thereafter.

(vii) Calculate the bleed water, if any, at the end of the three hour test period and the resulting expansion In accordance with the procedures outlined in ASTM C 940, with the quantity of bleed water expressed as a percent of the initial grout volume. Note if the bleed water remains above or below the top of the original grout height. Note if any bleed water is absorbed into the specimen during the test.

Grout used on the project shall have been sampled and tested within the last twelve months in accordance with the above referenced test procedures. The Contractor shall provide certified test reports for the grout used on the project from an independent AASHTO Accredited Laboratory and a sample of the grout for evaluation by the Department with the plan for grouting the ducts. The grout sample submitted to the Project shall be at least 2,000 grams in a sealed container. Grout which does not meet the above requirements shall not be used.

(c) *Mixing of Grout.* All grout shall be mixed with a high speed shear (colloidal) mixer.

(d) *Grouting.* All grouting operations shall be performed under the immediate control of the Contractor's designee. An individual of the post-tensioning system supplier, who possesses an ASBI Certified Grouting Technician Certificate and the grout supplier's field representative shall be available to provide technical expertise to the Contractor's designee as required during grouting.

The Contractor shall either perform or contract a commercial testing entity experienced with the following tests, in the presence of the Inspector/Engineer and report the results to the Engineer:

(1) One pressure bleed test per day in accordance with the "Schupack Pressure Bleed Test" using a Gelman Filter in accordance with the requirements in Appendix C of the "Specification for Grouting of Post-Tensioned Structures" by the Post-Tensioning Institute. The Gelman filtration funnel shall be secured vertically plumb in a stand. The maximum percent bleed shall be zero when the funnel is pressurized to 50 psi for evaluating installed ducts having a vertical rise greater than 6 feet; the maximum percent bleed shall be 2percent when the funnel is pressurized to 30 psi for evaluating installed ducts having a vertical rise greater than 2 feet but less than 6 feet; and the maximum percent bleed shall be 4 percent when the funnel is pressurized to 20 psi for evaluating installed ducts having a vertical rise that is less than 2 feet.

(2) Two mud balance tests, one at grout mixer and one at duct outlet, per day or when there is a visual or apparent change in the characteristics of the grout in accordance with the API Recommended Practice 13B-1 "Standard Procedure for Field Testing Water-Based Drilling Fluids". Acceptable specific gravity values for the grout shall be provided by the grout manufacturer and included with the grouting plan.

(3) Minimum of one strength test per day in accordance with ASTM C942 and the minimum 28 day compressive strength shall be 7000 psi.

(4) Minimum of two fluidity tests (flow cone) – one at the mixer and one at the duct outlet in accordance with ASTM C939, "Standard Tests Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)". The efflux time shall be as shown in Table 618-1.

Grout shall be injected from the lowest end of a tendon to the highest end in an uphill direction. A continuous, one-way flow of grout shall be maintained for each duct.

All grout vent openings shall be open when grouting starts. Grout shall be allowed to flow to the first vent from the inlet pipe until residual slugs of water or entrapped air have been eliminated and the grout has the same consistency as that of the grout being injected. The vent shall then be capped or otherwise closed. Remaining vents shall be capped or closed in sequence in the same manner except that at draped tendon high points, the secondary vents placed a short distance downstream from the high point vent shall be closed before the highpoint vent.

The Contractor shall inspect the interiors of box girders during grouting operations for grout leakage. Leaks shall be sealed before grouting is continued.

Grout shall be pumped through the duct and continuously wasted at the outlet pipe until all visible slugs of water or air are ejected. To insure that the tendon remains filled with grout, the outlet shall be closed and the pumping pressure allowed to build to a minimum of 75 psi and held for one minute before the inlet vent is closed.

For all vertical tendons that are 20 feet and taller, a standpipe shall be provided at the upper end of the tendon to collect bleed water and allow it to be removed from the grout. This device shall be designed with commercial steel plumbing fittings so that the grout level will not drop below the elevation at the highest point in the upper anchorage device due to bleeding. If the level of the grout drops below the highest point in the upper anchorage device, additional grout shall immediately be added to the standpipe. After the grout has hardened, the standpipe shall be removed.

For vertical internal tendons, if the grouting pressure exceeds the maximum recommended pumping pressure, the grout shall be injected at increasingly higher outlets (which become inlets) that have been or are ready to be closed as long as one-way flow of grout is maintained. Grout shall be allowed to flow from each outlet until all slugs of air and water have been purged prior to using that outlet for injection.

Plugs, caps, and valves thus required shall not be removed or opened until the grout has set.

The Contractor shall monitor all anchorages, grout ports and vents periodically until the grout sets. The Engineer shall be notified if bleed water is dripping from these locations. Bleed water may be an indication of voids and will require investigation by the Contractor after the grout sets.

After the grout has set, the grout port and vent plugs shall be removed. The Contractor shall inspect the tendon anchorages, grout ports and vents for voids or other evidence of incomplete grouting. If evidence is found of voids in these areas, the Contractor shall submit a plan for regrouting the voids to the Engineer for approval. All costs for remedial grouting will not be measured and paid for separately but shall be included in the work.

(e) *Temperature Considerations.*

The temperature of the concrete adjacent to the ducts shall be 40 °F or higher from the time of grouting until site cured 2-inch grout cubes, tested in accordance with AASHTO T 106, reach a minimum compressive strength of 800 psi.

Grout shall be between 40 and 90 °F during mixing and pumping. If necessary, the mixing water shall be heated or cooled.

**618.10 Equipment.** Equipment used for fabrication of pretensioned and combination tensioned members shall conform to the following requirements:

(a) *Jacking Equipment and Load Cells.* All equipment shall be calibrated as a system that represents actual use. Jacks, gage and pump systems, and load cells shall be calibrated at intervals not longer than 12 months, or whenever the tensioning system yields erratic results. Master gage systems shall be calibrated at intervals not longer than six months, or whenever the tensioning system yields erratic results. If load, sensor or indicator components are replaced or repaired, the system shall be recalibrated before resuming jacking operations. System error shall not exceed plus or minus 1 percent of the applied loads.

Calibration shall be performed by an agency or service that uses equipment certified by the National Institute for Standards and Technology (NIST). Accuracy of the calibration equipment shall be traceable to the NIST records. The calibration procedures used shall conform to ASTM Standard Practices E 4 and E 74. Each time that calibration verification is performed, a copy of the certified test report shall be furnished to the QA representative or the Engineer.

(b) *Concrete Batching Equipment.* The weighing system shall be calibrated at intervals no longer than 12 months. If disassembly, replacement, damage or repair of scales or balance indicators should occur, the weighing system shall be recalibrated before resumption of mix operations. Scale calibrations shall be performed in conformance with the State of Colorado - Department of Agriculture requirements. Current calibration labels shall be visibly displayed on the equipment.

The batching system shall record the weights of all concrete mix ingredients for each batch. Ingredient weights shall meet the requirements of ASTM C 94, Section 8, Measuring Materials.

The batching system shall be equipped with a flow meter which measures the weight or volume of the added mixing water within plus or minus 1 percent of the total water added to each batch.

(c) *Concrete Load Testing Machine.* The test machine shall meet the requirements of ASTM C 39.

(d) *Concrete Cylinder Molds.* Shall meet the requirements of ASTM C470.

(e) *Forms.* Forms shall be sufficiently mortar tight to minimize fresh mortar paste leakage, and sufficiently rigid to prevent product distortion due to concrete pressure or consolidation operations. Form joints shall be kept clean, smooth and adjusted to minimize form finish irregularities.

Forms shall be constructed and erected to produce units that conform to the product dimensional tolerances required by subsection 618.14(b); the forms shall also meet smoothness tolerances required by this subsection.

Forms shall be treated with a form release agent that does not adhere to or significantly discolor the final concrete product.

Forms that have known deviations from the typical sections shown on the plans shall be approved by the Engineer before use. The deviations shall be submitted on working or shop drawings.

(f) *Miscellaneous Test Equipment*. All miscellaneous test equipment used during fabrication shall be

kept in a condition such that accurate test results are obtained. Proper equipment maintenance and calibration shall be the responsibility of the Contractor's QC section.

**618.11 Concrete for Pretensioned and Combination Tensioned Products.** The Contractor shall furnish and place concrete according to this subsection.

(a) *Classification.* Concrete shall be designated as class PS. The Contractor shall be responsible for the actual mix proportions and adjustments necessary to produce the specified strength. The specified strengths and air content shall be as stated on the plans. Fly ash may be substituted for hydraulic cement up to a maximum of 25 percent by weight. If fly ash is used in the mix, the weight of the total cementitious material content shall be the sum of the weights of the hydraulic cement and fly ash.

When voluntary use of fly ash by the Contractor results in delays, changes in mix quantities or materials sources, or unsatisfactory work, the costs of such delays, changes or corrective actions shall be borne by the Contractor.

(b) *Concrete Mix Components.* Materials sources shall be listed in the Contractor's QCP. The QC Manager must notify the QA representative in writing before changing the sources as listed in the QCP. For new sources, the Contractor must submit certified data for review and acceptance by the Engineer, at least 30 days before the sources can be used for production. Materials shall conform to the requirements of subsection 618.02(c).

(c) *Proportioning.* The minimum total cementitious material content shall be 610 pounds per cubic yard of concrete. Fine aggregates shall not exceed 55 percent of the total aggregate volume. Aggregates from different sources and of different gradings shall not be stockpiled together.

(d) *Batching and Mixing.* Concrete shall be batched and mixed according to ASTM C 94.

(e) *Placing Concrete.* Forms shall be free of dirt, mortar, debris, and foreign substances before depositing the fresh concrete. Rust areas shall be cleaned to prevent rust staining of the finished products.

The concrete shall be consolidated with suitable mechanical vibrating equipment. Vibration time shall be of sufficient duration to accomplish adequate consolidation throughout the entire product, but shall not be prolonged to the point that segregation of the fresh concrete occurs.

The Contractor shall use the procedures listed in the QCP, to protect the freshly deposited concrete from rapid drying and surface moisture loss due to extreme ambient or climatic conditions.

Temperature limitations are as follows:

1. The temperature of the plastic concrete during placement operations shall not be lower than 50 °F.
2. Mixed concrete that has a temperature in excess of 90 °F shall not be placed.
3. Unless a suitable retarder is used the concrete shall be deposited in place within 90 minutes after batching; any load or portion of a load shall not be placed after the 90 minute limit.
4. Inner form temperature shall be within 40 °F of the fresh concrete temperature at time of concrete placement.
5. Minimum inner form temperature shall be 40 °F at the time of concrete placement.
6. Maximum inner form temperature shall be 130 °F at the time of concrete placement.

(f) *Finishing Fresh Concrete*. Open surfaces of fresh concrete shall be worked as little as possible to obtain the finish shown on the plans. Water shall not be added to the surfaces to ease finishing. Excessive water or laitance brought to the surface through vibration shall be removed before the surface is final finished. All hand finishing, required for precast members that have surfaces that become part of the final bridge deck surface, shall be performed in conformance with subsection 601.12(a).

Monomolecular film coatings or fogging systems, as approved by the QA Representative, may be used to retard evaporation during extreme ambient conditions. Application methods shall deposit a fine mist spray over the concrete surface. Streaming, puddling, or droplet application of coatings shall not be permitted. The concrete surfaces shall not be reworked after application of mist.

(g) *Concrete Testing*. The Contractor's QC section shall make representative cylinder test specimens for QC/QA testing. The Contractor shall forward test cylinders to the QA representative, for 28-day strength tests, and for shipping strength tests as required by subsection 618.15. Concrete tests shall be performed in accordance with the following requirements:

1. Test cylinder specimens shall be made in accordance with ASTM C 31. Vibration consolidation shall not be allowed unless the slump is less than 1 inch. Specimens shall be cured as listed in the accepted QCP.
2. Cylinders shall be tested in accordance with ASTM C 39. The average strength of at least two test cylinders shall be greater than the minimum required strength. No individual strength test shall be more than 7 percent below the minimum required strength.
3. Cylinder test specimens shall be made to verify stress transfer strength and to verify 28-day design strength. If the products will be shipped prior to 28-day testing, additional test specimens shall be available to verify product strength prior to shipment.
4. Representative cylinders shall be molded for each 50 cubic yards or portion thereof, for each different concrete mix design used per day per product line.
5. Air Content, when specified, shall be determined in accordance with either ASTM C 173 or ASTM C 231. Air entrained mixes shall be tested a minimum of once per day to assure specified air entrainment.
7. Slump of fresh concrete shall be determined in accordance with ASTM C 143. The slump shall be tested whenever test cylinder sets are made.
8. Unit Weight of fresh concrete shall be determined in accordance with ASTM C 138. Unit weight shall be tested a minimum of once per day for each different concrete mix design used.
9. Temperature of fresh concrete shall be taken as needed, to assure compliance with the temperature requirements.

**618.12 Curing.**

(a) *Pretensioned and Combination Tensioned Members.* Members shall be uniformly cured from the time of concrete placement until at least two representative product test specimens achieve an average strength that meets or exceeds 0.7 $f'_c$, or the specified release strength, $f'_{ci}$, whichever is higher.

Where:

$f'_c$ = 28 Day Compressive Strength of Concrete

$f'_{ci}$ = Required Concrete Strength at Release of Prestress Force

Additional curing requirements shall be maintained until the above strength requirements are achieved, and are as follows:

1. Exposed concrete surfaces shall be kept moist from the time of concrete placement until the freshly finished concrete is covered with an enclosure that retains heat and moisture. After enclosure, moist curing shall be maintained at a minimum 70 percent relative humidity.

   The Contractor shall monitor the temperature and humidity conditions from the initial curing period through the end of the accelerated curing stage.
2. Temperature of the concrete shall be maintained above 50 °F.
3. The internal and surface temperature of the concrete shall not exceed 160 °F.

4. Concrete shall attain initial set prior to application of the accelerated curing cycle. If initial set was not determined in accordance with ASTM C 403, accelerated curing shall not be induced for 4 hours, or 6 hours if retarding admixtures are used.

   While waiting for the initial set period, low cycle heat may be applied to maintain the curing chamber temperature; however, the temperature rise shall not exceed 10 °F per hour during the waiting period.

5. The rise in temperature in the curing chamber during accelerated curing cycle shall not exceed 40 °F per hour.

(b) *Cast-in-Place Members.* The curing of cast-in-place members shall conform to the requirements of subsection 601.13. The concrete shall not be exposed to temperatures below freezing for six days after casting, or until it has reached the strength required for applying the prestressing force. The minimum strength of the concrete shall be at least, 3500 psi for post-tensioned members, or as given on the plans whichever is greater, before prestressing.

(c) *Other Precast Members.* Precast members that do not contain pretensioned steel shall meet curing requirements as follows:

1. Exposed surfaces of freshly finished concrete shall be covered with moisture retaining material, or shall be treated with a concrete curing compound approved by the QA representative.

2. Temperature of the concrete shall be maintained above 50 ° F from the time of concrete placement until the curing is complete.

3. Uniform curing shall continue until at least two representative product test specimens achieve an average strength that meets or exceeds 0.7 $f'_c$ or the specified release strength $f'_{ci}$, whichever is higher.

4. The internal and surface temperature of the concrete shall not exceed 150 ° F.

**618.13 Repairs of Pretensioned and Combination Tensioned Members.** Repairable product defects discovered during QC or QA inspection, shall be corrected at the Contractor's expense prior to shipping. Damage incurred during handling, storage, shipment and erection shall be repaired or replaced at the Contractor's expense.

Defects shall be categorized as minor, structural, or rejectable. The QC section shall examine and record all defects. The QC section shall submit a written proposal for minor repairs to the QA Representative for review and acceptance prior to correcting the minor defects. The proposal shall also address the measures the Contractor will take to prevent recurring defects in future members. The QA Representative will approve, or reject, the finished repair work in writing.

Small production holes that are less than ½ inch in depth and less than 1 square inch in surface area, shall not be considered defects. Larger production holes shall be repaired according to the procedures listed in the QCP.

Structural and rejectable defects shall be examined by the Contractor's Engineer. A written proposal for repair of structural or rejectable defects shall be submitted to the QA Representative for review and acceptance prior to correcting any defects. The proposal shall include a detailed description and sketch of the defects, detailed repair procedures, description of repair materials, and the methods the Contractor will use to evaluate the finished repair work. The proposal shall also include the measures the Contractor will take to prevent recurring defects in future members.

Completed repairs shall be cured as needed to ensure soundness of the reworked area.

The defect categories and repair requirements are defined as follows:

(a) *Minor Defects*. Minor defects are those which do not affect the ability of the product to withstand service or construction loads. Minor defects include superficial discontinuities such as cracks; small spalls, voids and honeycombed areas; and defects that do not extend beyond the centerline of any reinforcing steel or into any elements of the tensioning system. Minor defects of other types may also be designated by the QA Representative.

Repair methods shall not affect the structural integrity of the product. The finished repair work shall meet the approval of the QA Representative and the Engineer.

(b) *Structural Defects*. Structural defects, as determined by the QA Representative or the Engineer, include defects which may impair the ability of the product to adequately withstand construction or service loads. Defects that extend beyond the centerline of any reinforcing steel or into any element of the tensioning system are classified as structural defects. Such defects also include cracks, spalls, honeycombed areas, voided areas, significant concrete breakage areas, cold joints, and segregated concrete areas. Structural defects of other types may also be designated by the QA Representative or the Engineer.

Repair methods shall adequately restore structural integrity of the product. When repairs have been completed, the Contractor's Engineer shall examine and analyze the product for construction and service load ability, and certify in writing that the repair work is structurally adequate. Evaluation and test data shall be submitted along with the written certification. The finished repair work, including aesthetic acceptability, shall meet the approval of the Engineer.

(c) *Rejectable Defects*. Rejectable defects or damages, as determined by the QA Representative or the Engineer, are those which impair the ability of the product to adequately withstand construction or service loads, and which cannot be successfully repaired to structural and architectural acceptability. Structurally defective or rejected products shall not be incorporated into the work but shall be replaced with acceptable products supplied at the Contractor's expense.

Damaged and defective products will also be rejected by the QA Representative for the following reasons:

1. Failure by the Contractor's Engineer to approve and submit proposed repair procedures in writing before repair work begins.
2. Failure by the Contractor to execute the repair work according to QA approved procedures.
3. Failure by the Contractor to provide written certification of acceptable structural repair, along with submittal of evaluation and test data, if applicable.
4. Failure by the Contractor to correct recurring defects.
5. Determination by the QA Representative that the work, or materials used in the work, does not meet all contract requirements.

**618.14 Other Fabrication Requirements for Pretensioned and Combination Tensioned Members.**

(a) *Finishing Hardened Concrete Products.* Finished and repaired areas shall reasonably match the coloration and profile characteristics of the adjacent concrete. Loose concretious laitance shall be removed from the product before storage.

Each finished product shall clearly display legible identification markings that show the cast date, piece mark and unique sub-mark. The marking shall also identify the setup location where the product was cast.

Finishing operations shall also conform to the following requirements:

1. Excessive laitance and unsound rubble shall be removed from surfaces to be bonded.
2. Fins and irregular projections shall be removed from the formed surfaces.
3. Bulges or offsets on the formed surfaces greater than ¼ inch shall be smoothed by stoning, sawing, or grinding.
4. Dented and inset surfaces greater than 4 square inches in area and deeper than ½ inch shall require a written repair proposal before repair or finish work begins.
5. Patches in areas of exposed steel or prestressing strand shall be bonded with an approved bonding agent and patched with an approved non-shrink grout.
6. If liquid membrane curing compounds are used on the concrete surfaces which are to be

bonded, they shall be removed by sandblasting, prior to shipping the product.

(b) *Product Dimensional Tolerances*. Tolerances for prestressed concrete products shall meet the unit tabulations listed in the PCI Manual MNL-116, unless otherwise stated in the Contract. The PCI tolerance figures and tabulations shall be specification requirements. Out-of-dimensional-tolerance variations shall be considered defects and shall be examined and evaluated by the Contractor's Engineer. The evaluation shall be submitted to the QA Representative in writing and shall contain written opinion of structural adequacy as determined by the Contractor's Engineer. The submittal shall meet the approval of the Engineer. Failure to submit the written evaluation and opinion will be cause for rejection.

The following work or products shall meet the specific PCI tolerance requirements described as follows, unless otherwise specified in the plans:

(1) Bulb-Tee Sections shall conform to Division VI, I-Beams.

(2) G-Series Sections shall conform to Division VI, I-Beams.

(3) Box Girders and U-Girders shall conform to Division VI, Box Beams.

(4) Deck Panels shall conform to the dimensional tolerances as listed in the PCI Special Report JR-343-88, Chapter 4, or the updated published edition thereof.

(c) *Handling, Storage, Shipment and Erection*. The Contractor shall handle the product in such a manner as to prevent cracking or damage. Cracked or damaged products shall be inspected by the QC section and repaired in accordance with subsection 618.13, or replaced at the Contractor's expense.

Braces, trusses, chains, cables, or other metal devices used for handling, storing, shipping, or erecting shall be adequately padded at points in contact with the concrete, to prevent chipping of the finished product.

Beam sections shall be handled, stored, shipped and erected with supports and devices that maintain the product in an upright position. Deck panels shall be lifted as directed in the Contract unless alternative lifting methods are allowed by the Engineer. Lifting of more than one panel at a time shall not cause panel cracking. Methods for multiple lifting of panels shall be shown on the working or shop drawings. Panel products shall be stacked in such a manner that damage does not occur.

Pre-cast concrete members shall be erected to prevent damage to all elements of the structure and in a safe manner. Pre-cast concrete members to which the erection specification applies are those members that bear on the substructure of a bridge. The primary members such as beams and girders shall be temporarily anchored and braced as they are erected to preclude detrimental movement in any direction, and to prevent overturning and buckling. Struts, bracing, tie cables, and other devices used for temporary restraint shall be considered falsework and shall be designed to resist all loads imposed during each stage of construction until the deck concrete has attained the Field Compressive Strength shown in Table 601-1.

At least one week prior to the Pre-Erection Conference, the Contractor shall approve, sign and submit an Erection Plan to the Engineer for record purposes only. The Erection Plan shall be stamped “Approved for Construction” and signed by the Contractor. The Erection Plan will not be approved by the Engineer. If falsework is required, falsework drawings shall conform to and be submitted in accordance with subsection 601.11.

The Erection Plan and procedure shall provide complete details of the erection process with dimension tolerances including:

(1) Falsework, struts, bracing, tie cables and other devices, material properties and specifications for temporary works, bolt torque requirements prior to releasing girders from the cranes (if required), connection details and attachments to other structure components or objects;

(2) Procedure and sequence of operations, including a detailed schedule with completion times for work items that complies with the working hour limitations;

(3) Minimum load chart lift capacity, outrigger size and reactions for each crane;

(4) Assumed loads and girder weights, lift points, lifting devices, spreaders, and angle of lifting cables.

(5) Girder stresses at critical points along the girder length during progressive stages of erection shall be investigated to assure that the structural integrity and stability of the girders is maintained. Stresses at lift points induced as a result of lifting shall be investigated and adequate bracing provided as indicated by the analysis.

(6) Locations of cranes, trucks delivering girders, and the location of cranes and outriggers relative to other structures, including retaining walls, wingwalls and utilities.

(7) Drawings, notes, catalog data showing the manufacturer's recommendations or performance tests, and calculations clearly showing the above listed details, assumptions, and dimensions.

(8) Contingency plans detailing what measures the Contractor will take in case of inclement weather (forecast or actual), equipment failure, delivery interruption, and slower than planned production.

A Pre-Erection Conference will be held at least one week prior to the beginning of erection. The Engineer, Contractor, erection subcontractor, and the Contractor's Engineer shall attend the meeting. The erection subcontractor shall demonstrate his knowledge and familiarity of where the piece marks are located on the components to be erected, their orientation in the erected structure, and the shop drawing piece mark convention used by the girder fabricator at the Pre-Erection Conference. The girder fabricator shall either attend the meeting or participate in the conference, by way of speaker telephone. Participation is required during that portion in which the piece marks are discussed. The girder fabricator shall state whether the erection subcontractor has demonstrated a correct understanding of the piece marks, and if not, correct any misunderstanding.

Additional Pre-Erection conferences may be required for subsequent phases of construction, or for phases that differ from the original construction plan, as directed by the Engineer. Additional conferences may also be requested by the Contractor, and approved by the Engineer.

The Contractor shall submit a final Erection Plan to the Engineer prior to girder erection for record purposes only. The Contractor's Engineer shall sign and seal (1), (5), and (7) listed above in the final Erection Plan. The final Erection Plan shall be stamped "Approved for Construction" and signed by the Contractor. The final Erection Plan will not be approved by the Engineer.

When a bridge spans traffic of any kind, except for construction traffic and the Contractor's employees, the Contractor's Engineer shall inspect and provide written approval of the erected girders prior to opening the area beneath the girders to traffic. For this specification, traffic is defined as the vehicles, railroad, pedestrians and watercraft moving along a route. The Contractor shall perform daily inspections of the erected girders and other permanent and temporary bridge elements until the deck concrete has attained the Field Compressive Strength. The Contractor's Engineer shall provide an inspection form to the Engineer and the Contractor that lists the items the Contractor will document during the daily inspection of the erected girders. The inspection form shall include inspection items specific to each bridge being constructed. The Contractor shall provide the Engineer and the Contractor's Engineer with written documentation of these inspections within 24 hours of each inspection.

All temporary struts, bracing, tie cables, other devices and extra material required shall be removed upon completion of the structure.

Falsework shall conform to subsection 601.11.

**618.15 Product Shipping Strength for Pretensioned and Combination Tensioned Members.** Products shall not be shipped before concrete strength meets or exceeds 0.95 $f'_c$, unless otherwise indicated on the plans. The average of at least two representative test specimens shall meet or exceed 0.95 $f'_c$. No individual specimen strength shall be more than 7 percent below 0.95 $f'_c$. The

shipping strength test specimens shall be cured in the same environment as the actual product until the time of testing. The QC section shall test the specimens for actual shipping strength. The QA Representative may independently verify any shipping strength tests.

The Contractor may elect to take concrete cores from the actual product in lieu of curing cylinder test specimens with the product. If the Contractor chooses this test option, the QC Manager shall submit written request to the QA Representative. Core extraction shall not begin until the request has been accepted in writing by the QA Representative. The written request shall include the proposed location and time schedule for core extraction and testing.

The cores shall be delivered in a wrapped and moist condition to the certified test laboratory as listed in the QCP. The QA Representative may witness any or all stages of the core testing operations. The test laboratory shall provide a copy of the formal test report to the QA Representative.

The Contractor shall bear all expenses associated with the optional core testing requirements. Sampling and testing of the concrete core specimens shall conform to ASTM C 42 with the following addenda:

(1) Samples may be removed at any age at the Contractor's sole risk of damage.

(2) Test cores shall not contain embedded reinforcement.

(3) A minimum of three core samples shall be taken from the product casting in question. Three specimens shall be tested for compressive strength. The average compressive strength of the three tests shall meet or exceed product f(c). If the compressive test result of any specimen differs from the average strength by more than 15 percent, those results shall be disregarded, and the compressive strength shall be determined from at least two remaining valid test results.

(4) If end capping of test specimens is necessary, the capping shall be done with sulfur mortar in accordance with ASTM C 617. Specimens shall be kept moist until end capping preparation begins.

Ends shall be trimmed or prepped as required, wiped with absorbent cloth and air-dried or fan-dried to prepare for end capping. The drying period shall not exceed 20 minutes before capping is completed.

Specimens shall be air-dried for 10 to 20 minutes after capping, then wrapped with a double layer of wet, thick cloth or burlap. Compressive testing shall not be started for at least one hour after wet-wrapping. The wrapped specimens shall be kept moist until compressive testing begins.

The Contractor shall submit a written repair proposal to the QA Representative for patching the core holes. Repair work shall not begin until the proposal is accepted in writing by the Engineer.

## METHOD OF MEASUREMENT

**618.16** Prestressed units will be measured by one of the following methods as indicated in the Contract.

(1) Prestressed girders will be measured by the linear foot from end to end or by the square foot, based on the plan length multiplied by the plan width, whichever is specified on the plans.

(2) Prestressed concrete box girders and prestressed concrete slabs will be measured by the square foot based on the plan length multiplied by the plan width.

(3) When measured by component materials, concrete and reinforcing steel will be measured and paid for in accordance with Sections 601 and 602 respectively.

The quantities of prestressing steel will not be measured but shall be the quantities shown on the plans, completed and accepted. MKFT equals the jacking force, in thousands of KIPS, times the length in feet.

Precast panel deck forms that are required by the plans will be measured by the square foot. The quantity will not be remeasured, but will be the quantity shown on the plans, except when a plan change is ordered or when it is determined that there are discrepancies in an amount of plus or minus two percent of the plan quantity.

**BASIS OF PAYMENT**

**618.17** The accepted quantities of prestressed units and prestressing steel will be paid for at the contract unit price per unit of measurement for each of the pay items listed below that is included in the bid schedule. Precast panel deck forms required by the plans will be paid for at the contract unit price for the area shown on the plans.

Payment will be made under:

| **Pay Item** | **Pay Unit** |
|---|---|
| Prestressing Steel Bar | Pound or MKFT |
| Prestressing Steel Strand | Pound or MKFT |
| Prestressed Concrete ___ (___) | Linear Foot or Square Foot |
| Prestressed Concrete Box (___) | Square Foot |
| Prestressed Concrete Slab (Depth _____) | Square Foot |

Payment will be full compensation for all work necessary to complete the designated pay item.

Prestressing steel bar and prestressing steel strand shall include but not be limited to all anchorage devices, prestressing steel, ducts, grout, and miscellaneous hardware. Elastomeric leveling pads, and galvanized steel diaphragms and connectors will not be paid for separately, but shall be included in the work. Concrete and reinforcing steel not shown on the plans but required by the Contractor's alternative will not be paid for separately but shall be included in the work. All required testing will not be paid separately but shall be included in the work.

Concrete quantities will not be reduced for the volume occupied by the ducts, prestressing steel, anchorages, blockouts for tensioning, etc., and will not include web flares, projections, warts, etc., required to accommodate the prestressing system used.

All costs associated with the preparation and implementation of the Erection Plan will not be paid for separately, but shall be included in the work.

Concrete, reinforcing steel, and prestressing steel for permanent steel bridge deck forms will not be measured and paid for separately, but shall be included in the work.

**REVISION OF SECTION 630**
**RETROREFLECTIVE SIGN SHEETING**

Section 630 of the Standard Specifications is hereby revised for this project as follows:

In subsection 630.02, delete the sixth and seventh paragraphs, including Table 630-1, and replace them with the following:

Retroreflective sheeting for all signs requiring an orange background shall be Type VI or Type Fluorescent.

Retroreflective sheeting for all signs requiring a yellow background shall be Type Fluorescent.

**Table 630-1**
**Retroreflective Sheeting Types**

| Sheeting | Type IV | Type VI (Roll-up sign material) | Type Fluorescent[1] |
|---|---|---|---|
| Application | Work Zone | Work Zone | Work Zone |
| All Orange Construction Signs | | | X |
| Orange Construction Signs that are used only during daytime hours for short term or mobile operations | | X[4] | X |
| Barricades (Temporary) | X | | X |
| Vertical Panels | X | | X |
| Flaggers Stop/Slow Paddle | X | | X |
| Drums[2] | X | | X |
| Non-orange Fixed Support signs with prefix "W" | X | | |
| Special Warning Signs | | | X |
| STOP sign (R1-1)<br>YIELD sign (R1-2)<br>WRONG WAY sign (R5-1a)<br>DO NOT ENTER sign (R5-1)<br>EXIT sign (E5-1a) | X | | |
| DETOUR sign (M4-9)<br>or<br>(M4-10) | | | X |
| All other fixed support signs[3] | X | | X |
| All other signs used only during working hours | X | | X |
| All other signs that are used only during daytime hours for short | X | X[5] | X |

| | | | |
|---|---|---|---|
| term or mobile operations | | | |

**1** Fluorescent Sheeting shall be of a brand that is on the CDOT Approved Products List.
**2** Drum Sheeting shall be manufactured for flexible devices.
**3** Fixed support signs are defined as all signs that must remain in use outside of working hours. They shall be mounted in accordance with Standard Plan S-630-1.
**4** RS 24 only.
**5** White only.

Project No. BRO M240-117
PCN 16986 November 18th, 2015

**REVISION OF SECTION 703**
**AGGREGATE FOR BASES (WITHOUT RAP)**

Section 703 of the Standard Specifications is hereby revised for this project as follows:

In subsection 703.03, delete the first paragraph and replace with the following:

**703.03 Aggregate for Bases.** Aggregates for bases except Aggregate Base Course (RAP) shall be crushed stone, crushed slag, crushed gravel, natural gravel, or crushed reclaimed concrete. Aggregate Base Course (RAP) shall be 100 percent crushed recycled asphalt pavement material. All materials except Aggregate Base Course (RAP) shall conform to the quality requirements of AASHTO M 147 except that the requirements for the ratio of minus 75 µm (No. 200) sieve fraction to the minus 425 µm (No. 40) sieve fraction, stated in 3.2.2 of AASHTO M 147, shall not apply.

The requirements for the Los Angeles wear test (AASHTO T 96 & ASTM C535) shall not apply to Class 1, 2, and 3. Aggregates for bases shall meet the grading requirements of Table 703-3 for the class specified for the project, unless otherwise specified.

**REVISION OF SECTION 703**
**CONCRETE AGGREGATES**

Section 703 of the Standard Specifications is hereby revised for this project as follows:

Delete the second paragraph of subsection 703.00 and Table 703-1.

Delete subsections 703.01 and 703.02 and replace with the following:

**703.01 Fine Aggregate for Concrete**. Fine aggregate for concrete shall conform to the requirements of AASHTO M 6, Class A. The minimum sand equivalent, as tested in accordance with Colorado Procedure 37 shall be 80 unless otherwise specified. The fineness modulus, as determined by AASHTO T 27, shall not be less than 2.50 or greater than 3.50 unless otherwise approved.

**703.02 Coarse Aggregate for Concrete.** Coarse aggregate for concrete shall conform to the requirements of AASHTO M 80, Class A aggregates, except that the percentage of wear shall not exceed 45 when tested in accordance with AASHTO T 96.

**REVISION OF SECTION 712**
**WATER FOR MIXING OR CURING CONCRETE**

Section 712 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 712.01 and replace it with the following:

**712.01 Water.** Water used in mixing or curing concrete shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetation, or other substance injurious to the finished product. Concrete mixing water shall meet the requirements of ASTM C1602. The Contractor shall perform and submit tests to the Engineer at the frequencies listed in ASTM C1602. Potable water may be used without testing. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, and other foreign materials.

**REVISION OF SECTION 713**
**EPOXY PAVEMENT MARKING**

Section 713 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 713.17 and replace with the following:

**713.17 Epoxy Pavement Marking Material.** Only epoxy pavement marking material that is on the Department's Approved Products List may be used. Batches or lots of approved products will be accepted on the project by certified test report (CTR). The CTR shall confirm that the material meets all CDOT requirements and is the same material that was preapproved in the product evaluation process.

(a) *Formulation.* Epoxy pavement marking material shall be a two component, 100 percent solids, material formulated to provide simple volumetric mixing ratio of two volumes of component A and one volume of component B unless otherwise recommended by the material manufacturer.

(b) *Composition.* The component A of both white and yellow shall be within the following limits:

**Resin / Pigment Components (% by Weight)**

| Pigment | WHITE: | YELLOW: |
|---|---|---|
| $TiO_2$, ASTM D476, Type II | 18-25 | 10-17 |
| Organic Yellow | | 6-10 |
| Epoxy Resin | 75-82 | 73-84 |

The pigment for yellow epoxy shall contain no lead or other material such that the cured epoxy could be considered a hazardous waste under EPA or CDPHE regulations. The Contractor shall submit to the Engineer a manufacturer's certification of compliance with this requirement.

(c) *Epoxide Number.* The epoxy number of the epoxy resin shall be the manufacturers target value ± 50 as determined by ASTM D 1652 for white and yellow component A on pigment free basis.

(d) *Amine Number.* The amine number on the curing agent (component B) shall be the manufacturers target value ± 50 per ASTM D 2071.

(e) *Toxicity.* Upon heating to application temperature, the material shall not produce fumes which are toxic or injurious to persons or property.

(f) *Color.* The epoxy material, without drop-on beads, shall correspond following requirements:

White – Federal Standard No. 595B-17925. The Yellowness Index (YI) of white shall not exceed 8.0 per ASTM E-313-10 initially.

After 72 QUV exposure per ASTM G-154 with a UVA-340 Lamp at an irradiance of 0.89 W/m2/nm with alternating cycles of 4 hours U.V @ 140º F, and 4 hours humidity @ 122º F the YI shall not exceed 20 when measured per ASTM E-313.

The YI, after 500-hour QUV testing as above, shall not exceed 35.

Yellow – Materials for pavement markings shall meet the initial daytime

chromaticity that fall within the box created by the following corner points:

Initial Daytime Chromaticity Coordinates (Corner Points)

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| x | 0.530 | 0.510 | 0.455 | 0.472 |
| y | 0.456 | 0.485 | 0.444 | 0.400 |

After 72-hour QUV exposure per ASTM G-154 with a UVA-340 Lamp at an irradiance of 0.89 W/m2/nm with alternating cycles of 4 hours U.V @ 140º F, and 4 hours humidity @ 122º F the Yellow shall fall within the initial chromaticity coordinates stated above.

(g) *Drying Time.* The epoxy pavement marking material shall have a setting time to a no-tracking condition of not more than 25 minutes at a temperature of 73° F and above.

(h) *Curing.* The epoxy material shall be capable of fully curing under the constant surface temperature condition of 35° F and above.

(i) *Adhesion to Concrete.* The catalyzed epoxy pavement marking material, when tested according to ACI Method 503, shall *have* such a high degree of adhesion to the specified (4000 psi minimum) concrete surface that there shall be a 100 percent concrete failure in the performance of this test

(j) *Hardness.* The epoxy pavement marking materials, when tested according to ASTM D 2240, shall have a minimum Shore D Hardness value of 80. Samples shall be allowed to cure at room temperature, 75 ± 2 °F for a minimum of 72 hours and a maximum of 168 hours prior to performing the indicated test.

(k) *Abrasion Resistance.* The abrasion resistance shall be evaluated on Taber Abrader with a 1000 gram load and CS-17 wheels. The duration of the test shall be 1000 cycles. The wear index shall be calculated based on ASTM test method C-501 and the wear index for the catalyzed material shall not be more than 80. The tests shall be run on cured samples of material which have been applied at film thickness of 15 ± ½ mils to code S-16 stainless steel plates. The samples shall be allowed to cure at 75 ± 2 °F for a minimum of 72 hours prior to performing the indicated tests.

(l) *Tensile Strength.* When tested according to ASTM D 638, the epoxy pavement marking materials shall have a tensile strength of not less than 6000 psi. The Type IV Specimens shall be cast in a suitable mold and pulled at the rate of ¼ inch per minute by a suitable dynamic testing machine. The samples shall be allowed to cure at room temperature (75 ± 2 °F) for a minimum of 72 hours and a maximum of 168 hours prior to performing the indicated tests.

(m) *Compressive Strength.* When tested according to ASTM D 695, the catalyzed epoxy pavement marking materials shall have a compressive strength of not less than 12,000 psi. The cast sample shall be conditioned at room temperature, 75 ± 2 °F, for a minimum of 72 hours and a maximum of 168 hours prior to performing the tests. The rate of compression of these samples shall be no more than ¼ inch per minute.

## AFFIRMATIVE ACTION REQUIREMENTS
## EQUAL EMPLOYMENT OPPORTUNITY

### A. AFFIRMATIVE ACTION REQUIREMENTS

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area are as follows:

**Goals and Timetable for Minority Utilization**

| *Timetable - Until Further Notice* | | | |
|---|---|---|---|
| **Economic Area** | **Standard Metropolitan Statistical Area (SMSA)** | **Counties Involved** | **Goal** |
| 157 (Denver) | 2080 Denver-Boulder | Adams, Arapahoe, Boulder, Denver, Douglas, Gilpin, Jefferson..... | 13.8% |
| | 2670 Fort Collins | Larimer..... | 6.9% |
| | 3060 Greeley | Weld..... | 13.1% |
| | Non SMSA Counties | Cheyenne, Clear Creek, Elbert, Grand, Kit Carson, Logan, Morgan, Park, Phillips, Sedgwick, Summit, Washington & Yuma..... | 12.8% |
| 158 (Colo. Spgs. - Pueblo) | 1720 Colorado Springs | El Paso, Teller..... | 10.9% |
| | 6560 Pueblo | Pueblo..... | 27.5% |
| | Non SMSA Counties | Alamosa, Baca, Bent, Chaffee, Conejos, Costilla, Crowley, Custer, Fremont, Huerfano, Kiowa, Lake, Las Animas, Lincoln, Mineral, Otero, Prowers, Rio Grande, Saguache..... | 19.0% |
| 159 (Grand Junction) | Non SMSA | Archuleta, Delta, Dolores, Eagle, Garfield, Gunnison, Hinsdale, La Plata, Mesa, Moffat, Montezuma, Montrose, Ouray, Pitkin, Rio Blanco, Routt, San Juan, San Miguel | 10.2% |
| 156 (Cheyenne - Casper WY) | Non SMSA | Jackson County, Colorado..... | 7.5% |
| GOALS AND TIMETABLES FOR FEMALE UTILIZATION<br>Until Further Notice.....6.9% -- Statewide | | | |

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts meet the goals established for the geographical area where the contract resulting form this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Par 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this specification, and in the contract resulting from this solicitation, the "covered area" is the county or counties shown on the Invitation for Bids and on the plans. In cases where the work is in two or more counties covered by differing percentage goals, the highest percentage will govern.

**B. STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS**

Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these Specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

   d. "Minority" includes;

      (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

      (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

      (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

      (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of

$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractor toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any office of Federal Contract Compliance Programs Office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following;

   a. Ensure and maintain a working environment free of harassment, intimidation , and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

   b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community

organizations when the Contractor or its union have employment opportunities available, and maintain a record of the organization's responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source of community organization and of what action was taken with respect to each individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when he Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc., by specific review of the policy with all management personnel and with all minority and female employees at least once a year, and by posting the Contractor's EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the Contractor's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc. such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and Contractor's activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligation.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goal and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even thought the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13 The Contractor in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form, however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

**C. SPECIFIC EQUAL EMPLOYMENT OPPORTUNITY RESPONSIBILITIES.**

1. *General.*

   a. Equal employment opportunity requirements not to discriminate and to take affirmative action to assure equal employment opportunity as required by Executive Order 11246 and Executive Order 11375 are set forth in Required Contract. Provisions (Form FHWA 1273 or 1316, as appropriate) and these Special Provisions which are imposed pursuant to Section 140 of Title 23, U.S.C., as established by Section 22 of the Federal-Aid highway Act of 1968. The requirements set forth in these Special Provisions shall constitute the specific affirmative action requirements for project activities under this contract and supplement the equal employment opportunity requirements set forth in the Required Contract provisions.

   b. The Contractor will work with the State highway agencies and the Federal Government in carrying out equal employment opportunity obligations and in their review of his/her activities under the contract.

   c. The Contractor and all his/her subcontractors holding subcontracts not including material suppliers, of $10,000 or more, will comply with the following minimum specific requirement activities of equal employment opportunity: (The equal employment opportunity requirements of Executive Order 11246, as set forth in Volume 6, Chapter 4, Section 1, Subsection 1 of the Federal-Aid Highway Program Manual, are applicable to material suppliers as well as contractors and subcontractors.) The Contractor will include these requirements in every subcontract of $10,000 or more with such modification of language as is necessary to make them binding on the subcontractor.

2. *Equal Employment Opportunity Policy*. The Contractor will accept as his operating policy the following statement which is designed to further the provision of equal employment opportunity to all persons without regard to their race, color, religion, sex, or national origin, and to promote the full realization of equal employment opportunity through a positive continuing program;

   It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, or national origin.

Such action shall include; employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training.

3. *Equal Employment Opportunity Officer*. The Contractor will designate and make known to the State highway agency contracting officers and equal employment opportunity officer (herein after referred to as the EEO Officer) who will have the responsibility for an must be capable of effectively administering and promoting an active contractor program of equal employment opportunity and who must be assigned adequate authority and responsibility to do so.

4. *Dissemination of Policy*.

   a. All members of the Contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the Contractor's equal employment opportunity policy and contractual responsibilities to provide equal employment opportunity in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum;

      (1) Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the Contractor's equal employment opportunity policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

      (2) All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer or other knowledgeable company official, covering all major aspects of the Contractor's equal employment opportunity obligations within thirty days following their reporting for duty with the Contractor.

      (3) All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer or appropriate company official in the Contractor's procedures for locating and hiring minority group employees.

   b. In order to make the Contractor's equal employment opportunity policy known to all employees, prospective employees and potential sources of employees, i.e., schools, employment agencies, labor unions (where appropriate), college placement officers, etc., the Contractor will take the following actions:

      (1) Notices and posters setting forth the Contractor's equal employment opportunity policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

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      (2) The Contractor's equal employment opportunity policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

   5. *Recruitment*.

      a. When advertising for employees, the Contractor will include in all advertisements for employees the notation; "An Equal Opportunity Employer." All such advertisements will be published in newspapers or other publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

b. The Contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants, including, but not limited to, State employment agencies, schools, colleges and minority group organizations. To meet this requirement, the Contractor will, through his EEO Officer, identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the Contractor for employment consideration.

In the event the Contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the Contractor's compliance with equal employment opportunity contract provisions. (The U.S. Department of Labor has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the Contractor to do the same, such implementation violates Executive Order 11246, as amended.)

c. The Contractor will encourage his present employees to refer minority group applicants for employment by posting appropriate notices or bulletins in areas accessible to all such employees. In addition, information and procedures with regard to referring minority group applicants will be discussed with employees.

`6. *Personnel Actions*. Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, or national origin. The following procedures shall be followed;

a. The Contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The Contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The Contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the Contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The Contract will promptly investigate all complaints of alleged discrimination made to the Contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the Contractor will inform every complainant of all of his avenues of appeal.

7. *Training and Promotion*.

a. The Contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the Contractor's work force requirements and as permissible under Federal and State regulations, the Contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical

area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

c. The Contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The Contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

8. *Unions*. If the Contractor relies in whole or in part upon unions as a source of employees, the Contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women with the unions, and to effect referrals by such unions of minority and female employees. Actions by the Contractor either directly or thorough a contractor's association acting as agent will include the procedures set forth below:

a. The Contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The Contractor will use best efforts to incorporate an equal employment opportunity clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, or national origin.

c. The Contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the Contractor, the Contractor shall so certify to the State highway department and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the Contractor with a reasonable flow of minority and women referrals within he time limit set forth in the collective bargaining agreement, the Contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion , sex or national origin; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The U.S. Department of Labor has held that it shall be no excuse that the union with which the Contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the Contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such Contractor shall immediately notify the State highway agency.

9. *Subcontracting*.

a. The Contractor will use his best efforts to solicit bids from and to utilize minority group subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of minority-owned construction firms from State highway agency personnel.

b. The Contractor will use his best efforts to ensure subcontractor compliance with their equal employment opportunity obligations.

10. *Records and Reports.*

a. The Contractor will keep such records as are necessary to determine compliance with the Contractor's equal employment opportunity obligations. The records kept by the Contractor will be designed to indicate:

(1) The number of minority and nonminority group members and women employed in each work classification on the project.

(2) The Progress and efforts being made in cooperation with unions to increase employment opportunities for minorities and women (applicable only to contractors who rely in whole or in part on unions as a source of their work force).

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees, and

(4) The progress and efforts being made in securing the services of minority group subcontractors or subcontractors with meaningful minority and female representation among their employees.

b. All such records must be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the State highway agency and the Federal Highway Administration.

c. The Contractors will submit an annual report to the State highway agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form PR 1391.

# DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENTS

## 1. Overview

The Disadvantaged Business Enterprise (DBE) Program is a federally-mandated program that seeks to ensure non-discrimination in the award of U.S. Department of Transportation (DOT)-assisted contracts and to create a level playing field on which DBEs can compete fairly for DOT-assisted contracts. To such end, CDOT sets a contract goal for DBE participation for each DOT-assisted Contract.

In order to be awarded the Contract, the bidder shall show that it has committed to DBE participation sufficient to meet the goal or has otherwise made good faith efforts to do so. CDOT will amend the goal prior to award if the lowest apparent bidder demonstrates that good faith efforts were made but sufficient commitments to meet the goal could not be obtained.

CDOT will monitor the progress of the Contractor throughout the project to ensure that the Contractor's DBE commitments are being fulfilled. Modifications to the commitments must be approved by CDOT. CDOT may withhold payment or seek other contractual remedies if the Contractor is not complying with the requirements of this special provision. Upon completion of the Contract, CDOT may reduce the final payment to the Contractor if the Contractor has failed to fulfill the commitments or made good faith efforts to meet the contract goal.

For general assistance regarding the DBE program and compliance, contact CDOT's Civil Rights and Business Resource Center (CRBRC) at (303)757-9234. For project specific issues, contact the Engineer.

All forms referenced herein can be found on the CDOT website in the forms library:

http://www.coloradodot.info/library/forms/cdot-forms-by-number

## 2. Contract Assurance

By submitting a proposal for this Contract, the bidder agrees to the following assurance and shall include it verbatim in all (including non-DBE) subcontracts:

> The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as CDOT deems appropriate.

## 3. Definitions

Terms not defined herein shall have the meaning provided in the CDOT Standard Specifications for Road and Bridge Construction.

A. *Commitment.* A commitment is a portion of the Contract, identified by dollar amount and work area, designated by the bidder or Contractor for participation by a particular DBE. Commitments are submitted to CDOT via Form 1414, Anticipated DBE Participation Plan, or via Form 1420, DBE Plan Modification Request. Once approved, commitments are obligations of the Contract that are enforceable by CDOT.

B. *Commercially Useful Function (CUF).* Responsibility for the execution of the work and

carrying out such responsibilities by actually performing, managing and supervising the work as further described in Section 8 below.

C. *Contract Goal.* The percentage of the contract designated by CDOT for DBE participation. The contract goal for this contract is provided in the Project Special Provision Disadvantaged Business Enterprise Contract Goal.

(1) The bidder/Contractor shall make good faith efforts to fulfill the contract goal with eligible DBE participation. For determining whether the contract goal was met prior to award, the contract goal shall be based upon the proposal amount excluding force account items. For determining whether the contract goal was met during and upon completion of the project, the contract goal shall be based upon the total earnings amount.

(2) If the lowest apparent bidder demonstrates that it was unable to meet the contract goal but made good faith efforts to do so, the contract goal will be amended and the revised contract goal will be provided on Form 1417, Approved DBE Participation Plan.

D. *Disadvantaged Business Enterprise (DBE).* A Colorado-certified Disadvantaged Business Enterprise listed on the Colorado Unified Certification Program (UCP) DBE Directory at www.coloradodbe.org.

E. *DBE Program Manual.* The manual maintained by the CRBRC which details CDOT's policies and procedures for administering the DBE program. A copy of the DBE Program Manual is available on the CRBRC webpage.

F. *Eligible Participation.* Work by a DBE that counts toward fulfillment of the contract goal as described in Section 4 below.

G. *Good Faith Efforts.* All necessary and reasonable steps to achieve the contract goal which, by their scope, intensity, and appropriateness to the objective, could reasonably be expected to obtain sufficient DBE participation, even if not fully successful. Good faith efforts are evaluated prior to award and throughout performance of the Contract. For guidance on good faith efforts, see 49 CFR Part 26, Appendix A.

H. *Joint Check.* A check issued by the Contractor or one of its subcontractors to a DBE firm and a material supplier or other third party for materials or services to be incorporated into the work.

I. *Reduction.* A reduction occurs when the Contractor reduces a commitment to a DBE. A reduction constitutes a partial termination.

J. *Subcontractor.* An individual, firm, corporation or other legal entity to whom the Contractor sublets part of the Contract. For purposes of this special provision, the term subcontractor includes suppliers.

K. *Substitution.* Substitution occurs when a Contractor seeks to find another DBE to perform work on the contract as a result of a reduction or termination.

L. *Termination.* A termination occurs when a Contractor no longer intends to use a DBE for fulfillment of a commitment.

M. *Total Earnings Amount:* Amount of the Contract earned by the Contractor, including approved changes and approved force account work performed, but not including any deductions for liquidated damages, price reduced material, work time violations, overweight loads or liens. The amount of the Contract earned does not include plan force account items (i.e. OJT, pavement incentives, etc).

N. *Work Code.* A code to identify the work that a DBE is certified to perform. A work code includes a six digit North American Industry Classifications System code plus a descriptor. Work codes are listed on a firm's profile on the UCP DBE Directory. The Contractor may contact the CRBRC to receive guidance on whether a work code covers the work to be performed.

**4. Eligible Participation**

The following rules will be used to determine whether work performed by a DBE qualifies as eligible participation on the Contract:

O. *Work Must be Identified in Commitment.* The work performed by the DBE must be reasonably construed to be included in the work area and work code identified by the Contractor in the approved commitment.

(1) If the Contractor intends to use a DBE for work that was not listed in the commitment, the Contractor shall submit Form 1420, DBE Participation Plan Modification for approval of the modification. Unapproved work will not count toward the contract goal.

(2) A DBE commitment cannot be modified to include work for which the DBE was not certified at the time of the approval of the original commitment.

P. *DBE Must be Certified to Perform the Work.* The DBE must be certified to perform the work upon submission of the commitment and upon execution of the DBE's subcontract.

(1) When a commitment has been made, but upon review of Form 205 or 205B, Sublet Permit, CDOT determines that the DBE is no longer certified in the work code which covers the work to be performed, the Contractor may not use the DBE's participation toward the contract goal. The Contractor shall terminate the DBE commitment and seek substitute DBE participation in accordance with Section 9 below.

(2) A DBE's work will continue to count as eligible participation if the DBE was certified upon approval of Form 205 or 205B, Sublet Permit and the certification status changes during the performance of the work.

(3) Suppliers must be certified upon execution of the purchase order.

Q. *DBE Performs the Work*. Eligible participation will only include work actually performed by the DBE with its own forces.

(1) Work performed by the DBE includes the cost of supplies and materials obtained

by the DBE for its work on the Contract, including any equipment leased by the DBE, provided that such supplies or equipment are not purchased or leased from the Contractor or a subcontractor that is subletting to the DBE.

(2) If CDOT determines that a DBE has not performed a CUF on the project, no participation by such DBE shall count toward the contract goal.

R. *DBE Subcontracts to Another Firm.* When a DBE subcontracts part of the work, the value of the subcontracted work may only be counted toward the goal if the subcontractor is a DBE. Performance by non-DBE subcontractors, including non-DBE trucking firms and owner-operators, shall be deducted from the DBE's participation.

S. *DBE Received Payment for the Work.* Eligible participation only includes work for which the DBE has received payment, including the release of its retainage.

T. *Special Calculations for Suppliers.* When a DBE supplies goods on a project, the DBE may be classified as a manufacturer, dealer or broker. The DBE's status as a manufacturer, dealer or broker is determined on a contract-by-contract basis and is based upon the actual work performed.

(1) When a DBE is deemed to be acting as a manufacturer, one hundred percent of the commitment will count as eligible participation.

(2) When a DBE is deemed to be acting as a regular dealer (i.e. non-manufacturer supplier), only sixty percent of the commitment will count as eligible participation.

(3) When a DBE is deemed to be acting as a broker, only the reasonable brokerage fee will count as eligible participation.

U. *Reasonable Fee for Contract-Specific Services.* Services shall count toward the contract goal only if they are specifically required for the performance of the Contract. Non-contract specific expenses may not be counted toward the contract goal. Fees for services must be reasonable. Services include but are not limited to professional services, public involvement, etc. In the case of temporary employment placement agencies, only the placement fee for an individual to be specifically and exclusively used for work on the contract shall count as eligible participation.

V. *Pre-Approval for Joint Venture Participation.* When a DBE is a participant in a joint venture, the DBE must apply to CDOT to determine how much of the work performed by the joint venture will count toward the contract goal. The DBE shall complete Form 893, Information for Determining DBE Participation when a Joint Venture Includes a DBE. Form 893 shall be submitted to CDOT no less than ten days before the submission of the Proposal to ensure sufficient time for review.

**5. Proposal Requirements**

In order to be eligible for award, the following shall be submitted with the proposal, or, for electronic bidders, via email to cdot_hq_dbeforms@state.co.us by the proposal submission deadline. In order to avoid an error within the electronic bidding system, electronic bidders shall also enter the total percentage of anticipated eligible DBE participation into the Form 714 and electronically sign the form.

W. *Form 1413, Bidders List.* The bidder shall list each subcontractor (including both DBE and non-DBE subcontractors) that submitted a quote for participation on the project. Failure to submit a signed Form 1413 will result in rejection of the proposal. *Form 1414, Anticipated DBE Participation Plan*. If the Contract Goal is greater than zero, the bidder shall submit Form 1414 to document anticipated DBE participation.

(1) If the Bidder has not obtained any DBE commitments, it shall still submit Form 1414 documenting zero anticipated participation. If the Contract Goal is greater than zero, failure to submit a signed Form 1414 shall result in rejection of the proposal.

(2) The bidder shall list the DBE, work area(s), commitment amount and estimated eligible participation for each commitment. Once Form 1414 is submitted, a commitment may only be terminated or reduced in accordance with Section 9 below. The bidder is responsible for ensuring that commitments, and the estimated eligible participation resulting therefrom, have been properly calculated prior to submitting its proposal.

(3) If the bidder is a DBE, the bidder must include itself in Form 1414 and list the work area(s) and amount that it intends to self-perform and count as eligible participation on the contract.

(4) Commitments may be made to second tier or lower DBE subcontractors; however, the Contractor is ultimately responsible for the fulfillment of the commitment and shall sign the Form 1415, Commitment Confirmation.

**6. Additional Forms Due Prior to Award.**

If the contract goal is greater than zero, or if the bidder has voluntarily made commitments, the Bidder shall submit the following forms within five calendar days of selection as the lowest apparent bidder:

X. *Form 1415, Commitment Confirmation*. A Form 1415, Commitment Confirmation shall be obtained from each DBE listed on Form 1414. The bidder shall complete Section 1 and the DBE shall complete Section 2 of Form 1415. Form 1415s shall be consistent with the commitments listed on Form 1414. The bidder shall not modify commitments listed on Form 1414 without good cause and approval from CDOT. The bidder shall contact CDOT if any issues arise which may require the bidder to alter or terminate a commitment.

Y. *Form 1416, Good Faith Effort Report.* If the total eligible participation listed on Form 1414 does not meet the contract goal, the lowest apparent bidder shall also submit Form 1416, Good Faith Effort Report and any supporting documentation that the bidder would like considered by CDOT as evidence of good faith efforts.

*7.* **Commitment and Good Faith Effort Review**

Z. *Commitment Review*. CDOT will evaluate the Form 1414 and each Form 1415 to ensure that it the commitment is valid and has been properly calculated. CDOT may investigate or request additional information in order to confirm the accuracy of a commitment. If CDOT determines that the total estimated eligible participation of the commitments does not meet the contract goal, within two business days of notice from CDOT or within the original five calendar day deadline, whichever is later, the bidder shall submit Form 1416 to CDOT.

AA. *Good Faith Effort Review.* If the total eligible participation of Form 1414 and all supporting Form 1415s does not meet the contract goal, CDOT will review Form 1416 and all supporting documentation submitted by the bidder in order to determine whether the bidder has demonstrated good faith efforts to obtain DBE participation. CDOT will use 49 CFR Part 26, Appendix A as a guide for determining whether the bidder made good faith efforts to meet the contract goal. A bidder will be deemed to not have made good faith efforts if the bidder lists a DBE for a work area for which the DBE is not certified and the bidder cannot establish a reasonable basis for its determination. CDOT may consider and approve commitments made after submission of the bid if the Bidder demonstrates that (1) good faith efforts were made prior to submission of the bid and (2) there is a reasonable justification for not obtaining the commitments prior to submission of the bid.

BB. *Administrative Reconsideration.* If CDOT determines that the bidder did not demonstrate good faith efforts to meet the contract goal, it will provide the bidder with written notice of its determination and an opportunity to appeal. The process for reconsideration is set forth in the *Good Faith Effort Appeal Process,* which is an Appendix I to the DBE Program Manual. A copy of the *Good Faith Effort Appeal Process* will be included in the written notice from CDOT.

CC. *Form 1417, Approved DBE Participation Plan.* If CDOT determines that the bidder has met the contract goal or made good faith efforts to do so, CDOT will issue Form 1417, Approved DBE Participation Plan, documenting the approved commitments. If CDOT determines that the bidder did not meet the contract goal but made good faith efforts to do so, via the Form 1417 CDOT will amend the contract goal in accordance with the commitments that were obtained and attach an explanation of its determination.

**8. Ongoing Oversight of DBE Participation**

A. *Consistency Review.* CDOT will review Form 205 or 205B, Sublet Permit Application to determine whether the work being sublet is consistent with the DBE commitments. CDOT may withhold approval of the sublet or stop performance of the work if the Contractor has reduced, terminated, or otherwise modified the type or amount of work to be performed by a DBE without seeking prior approval.

B. *Form 1419, DBE Participation Report.* The Contractor shall submit Form 1419, DBE Participation Report to the Engineer on a quarterly basis (January 15, April 15, July 15, and October 15) and upon completion of the Contract. CDOT may withhold progress payments if the quarterly Form 1419 is not received on time. CDOT will not provide final payment on the Contract in accordance with subsection 109.09 of CDOT's *Standard Specifications for Road and Bridge Construction* until the final Form 1419 has been reviewed and approved.

C. *Joint Checks*. All joint checks must be approved by CDOT before they are used in payment to a DBE. Joint checks used in payments to DBEs will be monitored closely to ensure (1) the DBE is performing a CUF and (2) the joint checks are not being used in a discriminatory manner. The Contractor shall request approval for the use of a joint check in a written letter signed by the DBE and the Contractor, stating the reason for the joint checks and the approximate number of checks that will be needed.

D. *Commercially Useful Function*. CDOT will monitor performance during the Contract to ensure each DBE is performing a CUF. If CDOT determines that a DBE is not performing a CUF, no

work performed by such DBE shall count as eligible participation. The DBE, Contractor, and any other involved third parties may also be subject to additional enforcement actions.

(1) When determining whether a DBE is performing a CUF, CDOT will consider the amount of work subcontracted, industry practices, the amount the firm is to be paid compared to the work performed and eligible participation claimed, and any other relevant factors.

(2) With respect to material and supplies used on the Contract, in order to perform a CUF the DBE must be responsible for negotiating price, determining quality and quantity, ordering the material, installing the material, if applicable, and paying for the material itself.

(3) With respect to trucking, in order to perform a CUF, the DBE trucking firm must own and operate at least one fully licensed, insured and operational truck used on the Contract. Additionally, the DBE trucking firm must be responsible for the management and supervision of the entire trucking operation for which it is responsible on the Contract.

(4) A DBE does not perform a CUF when its role is limited to that of an extra participant in a transaction, contract or project through which funds are passed in order to obtain the appearance of DBE participation. CDOT will evaluate similar transactions involving non-DBEs in order to determine whether a DBE is an extra participant.

(5) If a DBE does not perform or exercise responsibility for at least 30 percent of the total cost of its contract with its own work force, or the DBE subcontracts a greater portion of the work than would be expected on the basis of normal industry practice for the type of work involved, CDOT will presume that the DBE is not performing a CUF. The DBE may present evidence to rebut this presumption.

(6) If the Contractor disagrees with CDOT's determination regarding CUF, in accordance with 49 CFR 26.55 the Contractor may seek review of the determination by the applicable USDOT operating administration, however, CUF determination is not subject to administrative appeal.

**9. DBE Participation Plan Modifications**

A. *Form 1420, DBE Participation Plan Modification Request***.** During the performance of the Contract, the Contractor shall use Form 1420, DBE Participation Plan Modification Request to communicate all requests for *termination*, reduction, substitution, and waivers to CDOT. One Form 1420 may include multiple requests and must be submitted at the time of the occurrence or, if that is not possible, within a reasonable time of the occurrence requiring termination, reduction, substitution or waiver.

B. *Commitment Terminations and Reductions.* No commitment shall be terminated or reduced without CDOT's approval. Terminations and reductions include, but are not limited to, instances in which a Contractor seeks to *perform* work originally designated for a DBE subcontractor with its own forces, those of an affiliate, a non-DBE firm or with another DBE firm. In order to receive approval, the Contractor shall:

(1) Have good cause for termination or reduction. Good cause may include:

(i) the DBE fails or refuses to execute a written contract;

(ii) the DBE fails or refuses to perform the work of its subcontract consistent with normal industry standards, provided that such failure is not the result of bad faith or discriminatory actions of the Contractor or one of its subcontractors;

(iii) the DBE fails to meet reasonable, nondiscriminatory bond requirements;

(iv) the DBE becomes bankrupt, insolvent, or exhibits credit unworthiness;

(v) the DBE is ineligible to work because of suspension or debarment proceedings or other state law;

(vi) the DBE is not a responsible contractor;

(vii) the DBE voluntarily withdraws from the project and provides written notice to CDOT,

(viii) the DBE is ineligible to receive DBE credit for the work required;

(ix) the DBE owner dies or becomes disabled and is unable to complete the work;

(x) the DBE ceases business operations or otherwise dissolves;

(xi) or other documented good cause that compels termination. Good cause does not exist if the Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the Contractor can self-perform the work for which the DBE was engaged or so that the Contractor can substitute another DBE or non-DBE contractor after contract award.

(2) Provide the DBE notice of the Contractor's intent to terminate or reduce the commitment and the reason for such termination or reduction, with a copy to CDOT;

(3) In the notice of intent, provide the DBE at least five calendar days to respond to the notice and inform CDOT and the Contractor of the reasons, if any, why it objects to the proposed termination or reduction and any reasons that it shall not be approved. The Contractor is not required to provide the five calendar days written notice in cases where the DBE in question has provided written notice that it is withdrawing from the subcontract or purchase order. The notice period may be reduced by CDOT if required by public necessity.

(4) Following the notice period, if the Contractor decides to proceed, submit Form 1420 requesting approval of the termination or reduction.

(5) When a commitment is terminated or reduced (including when a DBE withdraws), make good faith efforts to find another DBE to substitute. These good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the participation that was terminated or reduced up to the contract goal.

C. *Contract Changes.* In the event of a contract change:

(1) If CDOT eliminates or reduces work committed to a DBE, such change shall be considered good cause for termination or reduction in accordance with Section 9.B above. The Contractor shall follow the processes outlined in Section 9.B but is not required to substitute. If the change reduces the Contractor's DBE participation to below the contract goal, the Contractor shall indicate so on a Form 1420 and request a waiver of the unmet participation.

(2) If CDOT issues a change which increases or adds new work items, the Contractor shall ensure that it has obtained sufficient DBE participation to meet the Contract Goal, or has made good faith efforts to do so.

D. *Process for Substitution or Increase in Participation to Meet the Contract Goal.* When the Contractor must obtain additional DBE participation to meet the Contract Goal, whether resulting from an approved termination or reduction or a change to the Contract, the Contractor shall:

(1) Increase the participation of a DBE for any work items previously identified in an approved commitment without seeking CDOT approval; provided, however, that at its discretion, CDOT may request a Form 1420 documenting such additional participation; or

(2) If the Contractor needs to add new work to a commitment or obtain additional participation from a DBE that is not already participating on the contract pursuant to an approved commitment, submit a Form 1420 and Form 1415 requesting approval of the additional participation; or

(3) If the Contractor determines that additional DBE participation cannot be obtained, submit a Form 1420 requesting waiver of the participation. The Contractor shall include its justification for not obtaining additional participation and, at its discretion, CDOT may require additional information regarding the efforts of the Contractor.

10. **Payment Reduction**

The Contractor's retainage will not be released until CDOT has determined whether the Contractor will be subject to a payment reduction. Payment reductions will be calculated as follows:

DD. *Failure to Fulfill Commitments.* If the Contractor terminated or reduced a commitment, the Contractor will be subject to a payment reduction for any termination or reduction which was not approved via a Form 1420.

EE. *Failure to Meet Contract Goal.* If the Contractor failed to meet the contract goal, the Contractor will be subject to a payment reduction for the portion of the contract goal that was not met and was not waived via an approved Form 1420.

FF. *Duplication.* The contractor will not be subject to duplicate reduction for the same offense.

GG. *Adjustments.* CDOT may adjust the payment reduction wherein the Contractor demonstrates that its failure to obtain DBE participation was due to circumstances outside of its control.

11. **Other Enforcement**

HH. *Investigations.* As it determines necessary, CDOT may conduct reviews or investigations of participants. All participants, including, but not limited to, DBE firms and applicants for DBE certification, complainants, and contractors using DBE firms to meet contract goals, are required to cooperate fully and promptly with compliance reviews, certification reviews, investigations, and other requests for information.

II. *Intimidation and retaliation.* Participants shall not intimidate, threaten, coerce, or discriminate against any individual or firm for the purpose of interfering with any right or privilege secured by the DBE program or because the individual or firm has made a complaint, testified, assisted, or participated in any manner in an investigation, proceeding, or hearing under the DBE program.

JJ. *Consequences of Non-Compliance.* Failure to comply with subsections 11 A. or 11 B. shall be a ground for appropriate action against the party involved (e.g., with respect to recipients, a finding of noncompliance; with respect to DBE firms, denial of certification or removal of eligibility and/or suspension and debarment; with respect to a complainant or appellant, dismissal of the complaint or appeal; with respect to a contractor which uses DBE firms to meet goals, findings of non-responsibility for future contracts and/or suspension and debarment).

KK. *Fraud and Misrepresentation*. If CDOT determines that a Contractor or subcontractor was a knowing and willing participant in any intended or actual subcontracting arrangement contrived to artificially inflate DBE participation or any other business arrangement determined by CDOT to be unallowable, or if the Contractor engages in repeated violations, falsification or misrepresentation, CDOT may:

(1) refuse to count any fraudulent or misrepresented DBE participation;

(2) withhold progress payments to the Contractor commensurate with the violation;

(3) suspend or reduce the Contractor’s prequalification status;

(4) refer the matter to the Office of Inspector General of the US Department of Transportation for investigation; or

(5) seek any other available contractual remedy.

## WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program.
If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7).
Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

**END OF GENERAL DECISION NO. CO150018**

## ON THE JOB TRAINING

This training special provision is an implementation of 23 U.S.C. 140 (a). The Contractor shall meet the requirements of the FHWA 1273 for all apprentices and trainees.

As part of the Contractor's Equal Employment Opportunity Affirmative Action Program, training shall be provided on projects as follows:

1. The Contractor shall provide on the job training aimed at developing full journey workers in the skilled craft identified in the approved training plan. The Contractor shall provide at a minimum, required training hours listed in the Project Special Provisions for each project.

2. The primary objective of this specification is to train and upgrade women and minority candidates to full journey worker status. The Contractor shall make every reasonable effort to enroll and train minority and women workers. This training commitment shall not be used to discriminate against any applicant for training whether or not the applicant is a woman or minority.

3. The Contractor may employ temporary workers from CDOT supportive services providers to meet OJT requirements. Information pertaining to supportive services providers may be obtained by calling the CDOT OJT Coordinator at the number shown on the link http://www.coloradodot.info/business/equal-opportunity/training.html

4. An employee shall not be employed or utilized as a trainee in a skilled craft in which the employee has achieved journey status.

5. The minimum length and type of training for each skilled craft shall be as established in the training program selected by the Contractor and approved by the Department and the Colorado Division of the Federal Highway Administration (FHWA), or the U. S Department of Labor (DOL), Office of Apprenticeship or recognized state apprenticeship agency. To obtain assistance or program approval contact:

   CDOT Center for Equal Opportunity
   4201 East Arkansas Avenue
   Denver, CO 80222
   eo@dot.state.co.us
   1-800-925-3427

6. The Contractor shall pay the training program wage rates and the correct fringe benefits to each approved trainee employed on the project and enrolled in an approved program. The minimum trainee wage shall be no less than the wage for the Guardrail Laborer classification as indicated in the wage decision for the project.

7. The CDOT Regional Civil Rights Manager must approve all proposed apprentices and trainees for the participation to be counted toward the project goal and reimbursement. Approval must occur before training begins. Approval for the apprentice or trainee to begin work on a CDOT project will be based on:

   A. Evidence of the registration of the trainee or apprentice into the approved training program.
   B. The completed Form 838 for each trainee or apprentice as submitted to the Engineer.

8. Before training begins, the Contractor shall provide each trainee with a copy of the approved training program, pay scale, pension and retirement benefits, health and disability benefits, promotional opportunities, and company policies and complaint procedures.

9. Before training begins, the Contractor shall submit a copy of the approved training program and CDOT Form 1337 to the Engineer. Progress payments may be withheld until this is submitted and approved and may be withheld if the approved program is not followed.

10. On a monthly basis, the Contractor shall provide to the Engineer a completed On the Job Training Progress Report (Form 832) for each approved trainee or apprentice on the project. The Form 832 will be reviewed and approved by the Engineer before reimbursement will be made. The Contractor will be reimbursed for no more than the OJT Force Account budget. At the discretion of the Engineer and if funds are available, the Engineer may increase the force account budget and the number of reimbursable training hours through a Change Order. The request to increase the force account must be approved by the Engineer prior to the training.

11. Upon completion of training, transfer to another project, termination of the trainee or notification of final acceptance of the project, the Contractor shall submit to the Engineer a "final" completed Form 832 for each approved apprentice or trainee.

12. All forms are available from the CDOT Center for Equal Opportunity, through the CDOT Regional Civil Rights Manager, or on CDOT's website at http://www.coloradodot.info/business/bidding/Bidding%20Forms/Bid%20Winner%20Forms

13. Forms 838 and 832 shall be completed in full by the Contractor. Reimbursement for training is based on the number of hours of on the job training documented on the Form 832 and approved by the Engineer. The Contractor shall explain discrepancies between the hours documented on Form 832 and the corresponding certified payrolls.

14. The OJT goal (# of training hours required) for the project will be included in the Project Special Provisions and will be determined by the Regional Civil Rights Manager after considering:

    A. Availability of minorities, women, and disadvantaged for training;
    B. The potential for effective training;
    C. Duration of the Contract;
    D. Dollar value of the Contract;
    E. Total normal work force that the average bidder could be expected to use;
    F. Geographic location;
    G. Type of work; and
    H. The need for additional journey workers in the area
    I. The general guidelines for minimum total training hours are as follows:

| Contract dollar value | Minimum total training hours to be provided on the project |
|---|---|
| Up to 1 million | 0 |
| >1 - 2 million | 320 |
| >2 - 4 million | 640 |
| >4 - 6 million | 1280 |
| >6 - 8 million | 1600 |
| >8 - 12 million | 1920 |
| >12 - 16 million | 2240 |

| | |
|---|---|
| >16 - 20 million | 2560 |
| For each increment of $5 million, over $20 million | 1280 |

15. The number of training hours for the trainees to be employed on the project shall be as shown in the Contract. The trainees or apprentices employed under the Contract shall be registered with the Department using Form 838, and must be approved by the Regional Civil Rights Manager before training begins for the participation to be counted toward the OJT project goal. The goal will be met by an approved trainee or apprentice working on that project; or, if a Contractor's apprentice is enrolled in a DOL approved apprenticeship program and registered with CDOT using Form 838 and working for the Contractor on a non-CDOT project. The hours worked on the non-CDOT project may be counted toward the project goal with approved documentation on Form 832. Training hours will be counted toward one project goal.

16. Subcontractor trainees who are enrolled in an approved Program may be used by the Contractor to satisfy the requirements of this specification.

17. The Contractor will be reimbursed $2.00per hour worked for each apprentice or trainee working on a CDOT project and whose participation toward the OJT project goal has been approved

18. The Contractor shall have fulfilled its responsibilities under this specification if the CDOT Regional Civil Rights Manager has determined that it has provided acceptable number of training hours.

19. Failure to provide the required training will result in the following disincentives: A sum representing the number of training hours specified in the Contract, minus the number of training hours worked as certified on Form 832, multiplied by the journey worker hourly wages plus fringe benefits [(A hours – B hours worked) x (C dollar per hour + D fringe benefits)] = Disincentives Assessed. Wage rate will be determined by averaging the wages for the crafts listed on Form 1337. The Engineer will provide the Contractor with a written notice at Final Acceptance of the project informing the Contractor of the noncompliance with this specification which will include a calculation of the disincentives to be assessed.

**REQUIRED CONTRACT PROVISIONS**
**FEDERAL-AID CONSTRUCTION CONTRACTS**

Attached is Form FHWA 1273 titled *Required Contract Provisions Federal-Aid Construction Contracts*. As described in Section I. General, the provisions of Form FHWA 1273 apply to all work performed under the Contract and are to be included in all subcontracts with the following modification:

For TAP (Transportation Alternatives Program) funded Recreational Trails projects, Section I (4) regarding convict labor and all of Section IV of the FHWA 1273 do not apply.

FHWA-1273 -- Revised May 1, 2012

# REQUIRED CONTRACT PROVISIONS
# FEDERAL-AID CONSTRUCTION CONTRACTS



## I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

## II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

**1. Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set

forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

**2. EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

**3. Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

**4. Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

**5. Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such

corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

**6. Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

**7. Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

**8. Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

**9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

**10. Assurance Required by 49 CFR 26.13(b):**

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

**11. Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

## III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

## IV. DAVIS BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

**1. Minimum wages**

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

**2. Withholding**

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

**3. Payrolls and basic records**

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee ( e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have

been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

**4. Apprentices and trainees**

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

**5. Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

**6. Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

**7. Contract termination: debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

**9. Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

**10. Certification of eligibility.**

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

## V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

**1. Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

**2. Violation; liability for unpaid wages; liquidated damages**. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

**3. Withholding for unpaid wages and liquidated damages.** The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

**4. Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

## VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

## VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

## VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

**This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.**

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more

places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

## IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

## X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting

agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended,

ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

## XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

**SPECIAL CONSTRUCTION REQUIREMENTS**
**FIRE PROTECTION PLAN**

(a) *Fire Protection Plan*. Prior to start of work, the Contractor shall submit a Fire Control Plan in writing to the Engineer for approval. The plan shall include the following:

(1) The name and contact information of a Fire Control Coordinator who shall be assigned to the project.
(2) A list of numbers to call in case of a fire, including 911 (or the equivalent in the area).
(3) A complete list, including storage locations, of all tools and equipment the Contractor will use in the event of a fire within project limits.
(4) Methods that will be employed if a fire is encountered or started during construction activities within the project limits.
(5) Specific fire prevention precautions, and the required firefighting equipment, for every activity which has the potential for starting a fire. At a minimum the plan shall address prevention planning related to use of heavy equipment, vehicles, hand tools, storage and parking areas.
(6) Specific precautions for fueling operations.
(7) Provisions for field safety meetings. The Contractor shall conduct field safety meetings (also known as toolbox or tailgate meetings) at least once per week. The Contractor shall encourage participation by all persons working at the project site. Participants shall discuss specific fire prevention precautions for construction activities.

(b) *Equipment and Procedures*.

(1) Fire Boxes. Fire boxes shall contain tools and equipment that shall be used exclusively for controlling or suppressing fires which occur due to construction activities on project sites. Each fire box shall contain, as a minimum, the following:

(1) five round-pointed shovels,
(2) two double-bitted axes,
(3) three pulaskis or mattocks, and
(4) two backpack pumps

(2) Welding. If welding at field locations is required, the welding shall be done at a location where all flammable material has been cleared away for a distance of 16 feet around the area.

(3) Spark Arrestors. All diesel and gasoline powered engines, both mobile and stationary, shall be equipped with serviceable spark arrestors.

(4) Power Saws. Each gasoline power saw shall be provided with a spark screen and a muffler in good condition. Spill-proof metal safety cans shall be used for refueling.
(5) Storage and Parking Areas. Batch plant areas, equipment service areas, parking areas, gas and oil drum storage areas, and explosive storage areas shall be cleared of all flammable materials for a distance of 50 feet. Small stationary engine sites shall be cleared of all flammable material for distance of 17 feet. Other mitigation methods may be used as approved by the Engineer

(c) *Fire Control Coordinator Responsibilities.* The Fire Control Coordinator shall:

(1) Implement the Fire Control Plan.
(2) Monitor, manage, and adjust the Fire Control Plan as needed as construction work progresses.
(3) Document in a letter to the Engineer changes to the Fire Control Plan.
(4) Immediately contact firefighting authorities when a fire is started due to construction activities within project limits.
(5) Coordinate fire control and suppression activities until authorities arrive, including the evacuation of staff.
(6) When the Fire Control Coordinator cannot be on the project site, he shall designate a person who is on site to serve as the Fire Control Coordinator. The Fire Control Coordinator, or his designee, shall be on site at all times that work is being performed.

(d) *Costs.* All costs associated with the preparation and implementation of the Plan and compliance with all fire protection provisions and requirements will not be measured and paid for separately, but shall be included in the work.

## 10.4 APPROVED LOCAL AGENCY SPECIFICATIONS

### A. City of Colorado Springs Standard Specifications

1. The "**City of Colorado Springs Engineering Division Standard Specifications**", revised January 2008, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

   Copies are available from the City of Colorado Springs, Office Services Division, Suite L01, 30 South Nevada Avenue, Colorado Springs, during regular business hours.

2. The "**Pikes Peak Region Asphalt Paving Specifications**", revised April 1, 2008, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

   Copies are available from the City of Colorado Springs, Office Services Division, Suite L01, 30 South Nevada Avenue, Colorado Springs, during regular business hours.

3. The "**Colorado Springs City Traffic Signal Installation and Parts Specifications for Contractors**", 6/1/2012 Edition, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

   Copies are available from the City of Colorado Springs, City Engineering Division, Suite L01, 30 South Nevada Avenue, Colorado Springs, during regular business hours.

4. The **"City of Colorado Springs Traffic Engineering Signage and Pavement Markings Guidelines**", 10/6/2006 Edition, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

   Copies are available from the City of Colorado Springs, City Engineering Division, Suite L01, 30 South Nevada Avenue, Colorado Springs, during regular business hours.

5. The "**City of Colorado Springs Drainage Criteria Manual, Volume II**", 2002, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

   Copies are available from the City of Colorado Springs, Office Services Division, Suite L01, 30 South Nevada Avenue, Colorado Springs, during regular business hours.

6. The "**City of Colorado Springs Traffic Control for Street Construction, Utility Work, and Maintenance Operations Supplement to the Manual on Uniform Traffic Control Devices**", 10/21/2009, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

   Copies are available from the City of Colorado Springs, Traffic Engineering Division, Suite 405, 30 South Nevada Avenue, Colorado Springs, during regular business hours.

7. The following sections of the "**City of Colorado Springs Parks and Recreation Specifications**", except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

   Section 02231 Tree Protection and Pruning
   Section 02810 Irrigation Systems
   Section 02920 Seeding and Sodding
   Section 02930 Exterior Plants
   Section 02950 Plantings

   Copies are available from the Colorado Springs Parks, Recreation, and Cultural Services, 1401 Recreation Way, Colorado Springs, CO 80905, during regular business hours.

**B. Colorado Springs Utilities Standard Specifications**

1. The Standard Specifications for water line construction and protection shall be the "**Colorado Springs Utilities Water Line Extension and Service Standards**", revised 2010, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety.

   Copies are available from the Colorado Springs Utilities' Development Services, 111 S. Cascade, Suite 105, Colorado Springs, CO 80903, during regular business hours.

2. The Standard Specifications for wastewater line construction and protection shall be the "**Colorado Springs Utilities Wastewater Line Extension and Service Standards**", revised 2010, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety.

   Copies are available from the Colorado Springs Utilities' Development Services, 111 S. Cascade, Suite 105, Colorado Springs, CO 80903, during regular business hours.

3. The Standard Specifications for lighting installation, electrical distribution and electrical transmission line construction and protection shall be the "**Colorado Springs Utilities Electric Line Extension and Service Standards**", revised 2012, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety.

   Copies are available from the Colorado Springs Utilities' Development Services, 111 S. Cascade, Suite 105, Colorado Springs, CO 80903, during regular business hours.

**C. Revisions to City of Colorado Springs Standard Specifications**

The following Revisions supplement or modify the City of Colorado Springs Engineering Division Standard Specifications. Measurement and Payment for all bid items shall be in accordance with Section IX - Measurement and Payment, and shall take precedence over the measurement and payment sections of the Standard Specifications or revisions thereof.

Revision of Section 220 – Removal of Structures and Obstructions
Revision of Section 240 – Reset Structures
Addition of Section 260 – Public Information Services
Addition of Section 519 – Thin Bonded Epoxy Overlay
Addition of Section 620 – Stone Masonry
Revision of Section 630 – Storm Drains and Culverts
Addition of Section 705 – Masonry Rock
Addition of Section 712 – Masonry Joint Material
Addition of Section 620 – Miscellaneous Material, Grout
Revision of Section 800 – Work Zone Traffic Control

**REVISION OF SECTION 220**
**REMOVAL OF STRUCTURES AND OBSTRUCTIONS**

Section 220 of the City of Colorado Springs Standard Specifications is hereby revised as follows:

Section 220 shall be revised to include the addition of:

Where sanitary sewer lines are to be abandoned in place, they shall be filled solid with a flowable fill material in conformance with the CDOT Standard Specifications for Road and Bridge Construction Section 206 Structure Backfill (flow fill) and securely closed by a tight fitting plug or wall of Class B concrete not less than 6 inches thick. Concrete Class B shall conform to the project specifications and the specifications stated in Section 601 of the CDOT Specifications for Road and Bridge Construction.

Where a sanitary sewer line is to be removed from an existing manhole, and said manhole is to remain in place, any openings left in the wall of the manhole due to the removal of the pipe shall be securely filled with Class B concrete and made to be watertight. Concrete Class B shall conform to the project specifications and the specifications stated in Section 601 of the CDOT Specifications for Road and Bridge Construction.

Where waterlines are to be abandoned in place, they shall be filled solid with a flowable fill material in conformance with the City Specification Section 206 and securely closed by a tight fitting plug or wall of concrete not less than one half the pipe diameter or 12 inches thick. Concrete shall conform to these specifications and the specifications stated in the City Specification Section 600. Asbestos cement pipe may be encountered on this project. The abandonment or removal of asbestos cement pipe shall follow chapter 6 of the Colorado Springs Utilities Water Line and Extension Service Standards, and the contractor shall be required to coordinate all work situations that involve asbestos cement pipe with Colorado Springs Utilities.

Section 220.01 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised as follows:

Section 220.01 Description, first paragraph shall be revised to include the addition of the following removal items: inlets, slope paving, pipes, manholes, walls, concrete, median cover material, sidewalk, curb and gutter, sign panel, light standards, trees, waterlines, rip rap, grouted rip rap, pipe end sections, electric pull boxes, pavement markings, and bridge.

Water meters removed shall be salvaged to Colorado Springs Utilities.

Neither the City nor the Engineer has conducted any investigations to determine if asbestos containing materials or if any hazardous materials are present in existing storm drainage facilities. If asbestos containing materials or hazardous materials are known or suspected to be encountered, contract is to stop work in that area, protect area from human contact and exposure, and contact the Engineer immediately. The Colorado Department of Transportation Standard Specifications Section 250 shall apply. Scope of work and payment for dealing with hazardous materials and proposed project adjustments will be negotiated with the contractor. Contractor shall be a part of and attend required meetings to discuss options and help find solutions.

Section 220.02 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised as follows:

Removal of Pipe, Abandon Pipe, or Plug Culvert shall include the following:

Storm drain pipes and pipe culverts that are either being removed, abandoned, or remaining in place and plugged.

Removed or abandoned storm drain facilities shall be disconnected from active storm drain facilities and the active facility connection point sealed (plugged) to contain and maintain the flow in the active storm drain facility.

When existing manholes, inlets, or pipes are to be abandoned, pipes entering the manhole or inlet shall be filled solid with a flowable fill material in conformance with the City Specifications Section 206 and securely closed by a tight fitting plug or wall of concrete not less than one half the pipe diameter or 12 inches thick or by a tight brick wall not less than 12 inches thick with cement mortar joints. Concrete shall conform to these specifications and the specifications stated in City Specification Section 600. The bases of manholes or inlets shall be broken in a manner to prevent entrapment of water. The manhole or inlet shall be demolished to an elevation three feet below finished grade and backfilled in conformance with these specifications and the specifications stated in Section 206 of the CDOT Standard Specifications for Road and Bridge Construction.

Removal of Ground Sign shall include removal and proper disposal of the entire foundation/footing down to at least a point 2 feet below proposed finished grade if approved by the Engineer. Ground signs designated as “Salvage Sign” shall be removed without damage and the sign panels and posts shall be delivered to the City’s Sign Shop as directed by the Engineer.

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**REVISION OF SECTION 240**
**RESET STRUCTURES**

Section 240.01 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised as follows:

Section 240.01 Description, first paragraph shall be revised to include the addition of the following reset item: Reset Sign.

Section 240.02 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised as follows:

Section 240.02 Construction Requirements, add the following paragraph: Signs to be reset shall be cleaned after removal and prior to resetting. Reset signs shall maintain the same post type in order to keep agency maintenance responsibilities the same.

Section 240.02 Construction Requirements, add the following paragraph: Adjusting Manhole and Modify Inlet shall include the addition and removal of rings, covers, frames, and grates.

**ADDITION OF SECTION 260**
**PUBLIC INFORMATION SERVICES**

The City of Colorado Springs Engineering Division Standard Specifications are revised to include the addition of Section 260 – Public Information Services

**260.01 Description**

The Evan's Avenue Bridge Replacement Project will be constructed in a densely urbanized area containing existing educational institutions, neighborhoods, apartments and businesses. Construction will inevitably cause disruption and inconvenience.

The City of Colorado Springs will ensure that the public, the neighborhoods, and the businesses in the area are well informed of the construction phasing, scheduling, and detouring. Further, that the public, residents, and businesses have an opportunity to get questions answered and work with the contractor to minimize inconvenience. Written, verbal, and electronic communication with the public and the City will be required to ensure that the public, neighborhoods, and businesses:

Are kept informed of continuing and upcoming work and scheduling

Have a clear method for asking questions and getting responses

Have an opportunity to meet directly with the contractors and look for practicable opportunities to diminish construction disruption

To retain continuity between the planning, engineering, and construction of the project, the Engineer will work closely with the Contractor and the public. The Engineer will coordinate closely with the Contractor to inform the public, businesses, and residents of construction work throughout the project. All communication requires approval by the City and will be distributed by the City.

This work includes providing the information necessary to the City throughout the duration of the project so that the City can communicate effectively with affected property owners and the public. The work required by the Contractor to allow the City to effectively communicate with affected property owners and the public is incidental to the contract.

**260.02 Coordination Requirements**

**Responsibility and Coordination** The Contractor is responsible for preparing and distributing construction and scheduling information to the Engineer for the duration of the project. Regular communications include the following:

**Phasing** Prior to the beginning of each different phase of construction, the Contractor shall prepare information explaining the phase for distribution by the Engineer.

**Initial Construction Notice** Prior to the start of initial construction activity, City approved notice information will be sent to impacted and interested stakeholders by mail or in person. The initial contact list will be provided by the Engineer. The Contractor shall maintain the contact list throughout the duration of the project and update all new contacts weekly.

**Bi-weekly Project Reports** Project information such as project schedules, upcoming closures and detours, phasing schedules and completion dates, or other activities that may

disrupt the businesses or residents will be provided to the Engineer at least bi-weekly. If activities are happening on a more rapid pace, updates will be required weekly.

**E-mail Communications** The Contractor will prepare draft E-mail communications for approval by the City prior to distribution. The Contractor will maintain a contact e-mail list of all parties who request regular updates by e-mail. The E-mail communications (E-Blasts) will be sent to the public, residents and businesses to inform them of upcoming detours, closures, and construction disruptions. These will be required monthly as well as during unusual occurrences and are intended to keep the public informed of near-term project activity.

**Night Work Flyers** Creation and distribution of flyers for residents and businesses near sites where night work will take place a minimum of 24 hours in advance of the start of any and all night work.

**Communication Log** The Contractor shall maintain a log of all contacts made, information provided, comments received and responses provided. This log shall be provided to the City Representative and the Engineer at the end of each week.

**Traffic Signs** The Contractor shall post the phone number of the public information voicemail system on traffic signs at each end of the project for the public to call for information and to make comments.

**Responsiveness:**

**Image and Timeliness** In general, the Contractor, acting as a good neighbor and guest in the project area, will respond to the requests and comments of impacted residents/businesses, thereby building a positive image of the Contractor and the City. The Contractor shall respond to requests and inquiries within 24 hours.

**Changes in Construction** The Contractor shall call the Engineer immediately regarding traffic shifts, detours, lane closures and any other construction activity that is a change from what has been approved and that would impact motorists.

**Availability:**

**Availability** The Contractor shall be accessible by phone at all times; in the construction trailer, by cell phone when off the job site, at home in the evenings or on weekends in cases of emergency.

# ADDITION OF SECTION 519
# THIN BONDED EPOXY OVERLAY

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Materials and procedures for applying a protective crack treatment and bridge deck overlay using either an epoxy-urethane co-polymer (Type 1) or a modified epoxy polymer (Type 2) with a broadcast aggregate wearing surface.

B. Procedures for removing polymer overlay from concrete deck.

### 1.2 RELATED SECTIONS

A. Section 03934: Structural Pothole Patching

### 1.3 REFERENCES

A. AASHTO T 242: Frictional Properties of Paved Surfaces Using a Full-Scale Tire

B. ASTM C 566: Total Evaporable Moisture Content of Aggregate by Drying

C. ASTM C 579: Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

D. ASTM C 881: Epoxy-Resin-Base Bonding Systems for Concrete

E. ASTM D 570: Water Absorption of Plastics

F. ASTM D 638: Tensile Properties of Plastics

G. ASTM D 790: Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

H. ASTM D 2240: Rubber Property – Durometer Hardness

I. ASTM D 4263: Indicating Moisture in Concrete by the Plastic Sheet Method

J. ASTM D 4285: Indicating Oil or Water in Compressed Air

K. ASTM D 5821: Determining the Percentage of Fractured Particles in Coarse Aggregate

L. ASTM E 965: Measuring Pavement Macrotexture Depth Using a Volumetric Technique

M. American Concrete Institute (ACI)

N. International Concrete Repair Institute (ICRI)

### 1.4 DEFINITIONS

A. Polymer Overlay System – A two-part polymer resin system applied as a wearing surface and saturated with a broadcast aggregate before it cures. The polymer uses volumetric mixing proportions according to the manufacturer's recommendations.

### 1.5 SUBMITTALS

A. Manufacturer
   1. The name of the polymer overlay manufacturer and the name and phone number of the manufacturer's Technical Support Representative at the Pre-Construction Meeting.

B. Certificate of Compliance
   1. A certificate of compliance from an independent nationally recognized laboratory stating that the polymer overlay materials meet the requirements contained in this specification, to the Engineer for approval at least 10 days before placement. Additional approval needed for any substitutes.

C. Furnish at least a one quart sample of each component from each lot to the Department laboratory to verify material supplied.

## PART 2 PRODUCTS

### 2.1 POLYMER OVERLAY SYSTEM

A. Use a thin bonded polymer bridge deck overlay system using either an epoxy-urethane co-polymer (Type 1) or modified epoxy polymer (Type 2) as specified on the plan or detail sheets that meet the requirements of Table 1 and includes all materials, penetrating crack filler when required by the manufacturer, and polymer resin broadcast that chemically cures to provide an impervious wearing surface.

Table 1

| PHYSICAL PROPERTIES OF THE CURED OVERLAY SYSTEM | | |
|---|---|---|
| **Property** | **Value** | **Method** |
| Compressive Strength, min. psi | 5,000 | ASTM C 579 |
| Tensile Strength, min. psi | 2,000 | ASTM D 638 |
| Tensile Elongation, min. percent | 30-80 | ASTM D 638 |
| Water Absorption, max. percent by wt. | 1.0 | ASTM D 570 |
| Shore D Hardness, min. 77°F | 60-75 | ASTM D 2240 |
| Gel Time, minutes | 15-45 | ASTM C 881 |
| Adhesion to Concrete | 100% failure in concrete | ACI-503-R, Pull Out Test |
| Flexural Yield Strength, min. psi | 3,000 | ASTM D 790 |
| Percent Solids | 100 | |

1. Type 1 – Epoxy-Urethane Co-Polymer
   a. Provide polymer resins consisting of a blend of epoxy and urethane materials that meet the physical requirements outlined in this Section.
   b. Provide a polymer overlay free of any fillers and volatile solvents. The use of external/conventional flexibilizers is not permitted.
   c. Provide penetrating crack filler system as required by the manufacturer.
   d. Use metered mixing equipment as outlined in this Section with the use of this material.
2. Type 2 – Modified Epoxy Polymer
   a. Provide polymer resins consisting of modified epoxy materials that meet the physical requirements outlined in this Section.
   b. Use of additives, fillers, volatile solvents, and flexibilizers to modify the physical properties of the epoxy to meet physical requirements is acceptable.
   c. Use of metered mixing equipment as outlined in other parts of this Section is NOT required with the use of this material but is highly recommended.
   d. A Type 1 epoxy-urethane co-polymer may be substituted for the Type 2 polymer for projects specifying a Type 2 modified epoxy polymer.

B. Provide a penetrating crack filler system as required by the manufacturer.

C. Aggregate
1. Clean and free of surface moisture according to the requirements in this Section.
2. Proven record of durability in this type of application.
3. 100 percent of the aggregate has at least one mechanically fractured face for materials being retained on the #10 sieve according to ASTM D 5821.
4. Thoroughly washed and kiln dried to maximum moisture content of 0.2 percent by weight according to ASTM C 566.
5. Use aggregate with the properties shown in Table 2 or with the aggregate with the properties shown in Table 3 with manufacturer's and Engineer's approval.
6. Provide aggregate gradation according to the requirements of Table 4.

Table 2

| GLACIAL GRAVEL AGGREGATE PROPERTIES (BASALT QUARTZITE GRANITE) | |
|---|---|
| **Properties/Materials** | **% by Weight** |
| $Si0_2$ | 75.03 |
| $Al_2O_3$ | 11.49 |
| $Fe_2O_3$ | 3.57 |
| CaO | 2.84 |
| MgO | 1.59 |
| $Na_2O$ | 2.58 |
| $K_2O$ | 0.99 |
| Combined Alkali | 1.11 |
| Ignition Loss | 0.72 |
| Mohs Scale Hardness | 6.50 |
| ASTM 566 (water absorption) | 0.2% |

Table 3

| ABRASIVE FLINT AGGREGATE PROPERTIES | |
|---|---|
| **Properties/Materials** | **% by Weight** |
| $Si0_2$ | 97.70 |
| $Al_2O_3$ | 0.45 |
| $Fe_2O_3$ | 0.30 |
| $CaCO_3$ | 0.35 |

Table 4

| AGGREGATE GRADATION | |
|---|---|
| **Sieve Size** | **Percent Passing** |
| 0.187 inch; No.4 | 100 |
| 0.078 inch; No.10 | 10 – 35 |
| 0.033 inch; No.20 | 0 – 10 |

## PART 3 EXECUTION

A. Job Site Polymer Material Storage
   1. Transport to and store on the job site in a dry, weather protected facility away from moisture and within the maintained temperature range of 60 to 100 degrees F or according to manufacturer's recommendations.

B. Handling Liquid Materials on the Job
   1. Use protective gloves, clothing, boots, and goggles when directly exposed to the material.
   2. Provide product safety data sheets obtained from the manufacturer to all workers and inspectors.

C. Aggregate
   1. Store all aggregate in a dry, moisture-free atmosphere.
   2. Fully protect the aggregate from any contaminants on the job site and store so it will not be exposed to rain or other moisture sources.

D. Packing Requirement

1. Pack all materials in strong, substantial containers.
2. Identify the containers as Part A and Part B and plainly mark with:
   a. Manufacturer's name
   b. Manufacturer's address
   c. Name of the product
   d. Mixing proportions and instructions
   e. Lot and batch numbers
   f. Date of manufacture
   g. Quantity

## 3.2 SURFACE PREPARATION

A. Deck Repair
1. Repair any minor deck surface defects before installing the polymer system using a patch material that meets manufacturer's recommendations and is compatible with the polymer system being used.
2. Provide patch materials free of magnesium phosphate.
3. Verify moisture content of patch meets other requirements of this Section before applying overlay.

B. Shot-Blasting
1. Clean the entire concrete deck surface with steel shot blast to remove any oil, dirt, rubber, or other materials that may be detrimental to the polymer overlay bonding and curing according to the manufacturer recommendations. Refer to ASTM D 4285.
2. Use sandblasting equipment or mechanical grinders with approval of the manufacturer and Engineer in areas that cannot be reached with the steel shot-blasting.
   a. Perform this operation before shot-blasting whenever practical.
3. Produce a surface relief equal to the International Concrete Repair Institute (ICRI) Surface Preparation Level 5-7 or ASTM E 965 Pavement Macro-Texture Depth of 0.04 to 0.08 inch.

C. Traffic
1. Do not allow traffic on any portion of the deck that has been shot-blasted.
2. Only allow overlay equipment on cleaned surfaces with manufacturer's supervision.

D. Weather
1. Verify that all treated surfaces are dry at the time of application.
2. Do not apply the polymer overlay system when it has rained within 24 hours or is expected to rain within 8 hours of application unless otherwise approved by manufacturer and Engineer.
3. Verify the moisture content in the concrete substrate does not exceed 4.5 percent when measured by an electronic meter and that it is completely dry according to the method in ASTM D 4263.
4. Apply the polymer overlay system only when the deck and ambient air temperature is a minimum 50 degrees F.

## 3.3 APPLICATION

A. Concrete Surface
   1. Clean the concrete surface and apply a penetrating crack filler system as required by the manufacturer.

B. Use Metered Mixing Equipment for Type 1 Co-Polymers (optional for Type 2 Polymers)
   1. Use special equipment capable of metering, mixing, and distributing the polymer.
   2. Use machinery that is approved by the manufacturer.
   3. Use an application machine that features positive displacement volumetric metering pumps controlled by a hydraulic power unit.
   4. Use motionless, in-line mixing so as to not overly shear the material or entrap air in the mix.
   5. Maximize material working time by mixing it immediately before dispensing.

C. Thickness of Individual Layers
   1. Provide the number of layers and application rates of the liquid in the various layers according to the manufacturer's recommendations to achieve a minimum overlay thickness of 0.375 inch.

D. Penetrating Crack Filler System (when required by manufacturer)
   1. Install according to manufacturer's recommendations.

E. First and Second Layers of Overlay
   1. Completely remove any excess or loose aggregate by vacuum or with compressed air before the application of each layer.
   2. Manually or mechanically measure and mix the components as recommended by the manufacturer and evenly distribute the liquid on the clean, dry deck surface at the rate recommended by the manufacturer.

F. Time Limits for Aggregate
   1. Use the following maximum time allowed after application of liquid before broadcasting the aggregate unless directed otherwise by the manufacturer.

Table 5

| **Time Limits** | |
|---|---|
| **Temperature** | **Maximum Time** |
| Above 90°F | 10 minutes |
| 80°F to 90°F | 15 minutes |
| 70°F to 80°F | 20 minutes |
| 60°F to 70°F | 25 minutes |
| 50°F to 60°F | 35 minutes |

G. Broadcasting Aggregate
   1. Use truck mounted equipment capable of dispensing the aggregate onto the deck in a uniform manner as directed or approved by the manufacturer.
   2. Broadcast the aggregate to cover the surface so that no wet spots appear and before the polymer begins to gel.

3. Drop the aggregate vertically so the level of the liquid is not disturbed.
4. Broadcast the aggregate according to Tables 2 or 3 and Table 4 to saturate until no wet spots remain.

H. Remove Excess Aggregate
1. Remove all loose and excess aggregate after the overlay has hardened and before applying subsequent layers using a power vacuum or other method.

I. Longitudinal Joints in the Overlay
1. Stagger and overlap joints between successive layers so that no ridges appear between two adjacent lanes.

J. Traffic
1. Do not allow any vehicles on the overlay while it is curing.
2. Allow traffic on the final layer or in between layers after the resin has cured, as determined by the manufacturer, and after removal of all excess and loose aggregate.

## 3.4 QUALITY CONTROL

A. Technical Support Representative
1. Manufacturer's representative must be on the job site at all times and may consult with the Engineer to suspend any item of work that is suspect and does not meet the requirements of this Section.
2. Work may resume only after the manufacturer's representative and the Engineer are satisfied that the Contractor has taken appropriate remedial action.

B. Prior Performance
1. The selected material must have a satisfactory performance in Utah for at least two years from the time of placement.
2. Products without a two year prior satisfactory performance will be considered as experimental and will only be considered for use with the approval of the Engineer after the award of the contract. Do not use for bidding purposes.

## 3.5 POLYMER OVERLAY REMOVAL

A. Remove existing polymer overlay as required by drawings, specifications, manufacturer, or Engineer.
1. Remove existing thin bonded polymer overlay from deck with a diamond-tipped grinder.
2. Do not damage concrete deck or underlying rebar when removing thin bonded polymer overlay.
3. Repair any damage to bridge concrete or reinforcing steel resulting from polymer overlay removal operations.
   a. Repair concrete at the Contractor's expense.
   b. Meet the requirements of Section 03934.

END OF SECTION

## ADDITION OF SECTION 620
## STONE MASONRY

### Description

**620.01** This work consists of constructing or rehabilitating stone masonry structures and the stone masonry portions of
composite structures.
Masonry class is designated according to Subsection 705.03 and as follows:

**(a) Dimensioned masonry.** Stones are cut in two or more dimensions and laid in a broken-course pattern in mortar.

**(b) Class A masonry.** Stones are shaped, dressed to within 1/4 inch of true line, and laid in mortar.

**(c) Class B masonry.** Stones are shaped, dressed to within 3/4 inch of true line, and laid in mortar.

**(d) Rubble masonry.** Stones vary in size and shape, are roughly dressed, and laid in random courses in mortar.

Finish for exposed faces is designated according to Subsection 705.03(f).

### Material

**620.02** Conform to the following Section and Subsections:

| | |
|---|---|
| Concrete | 601 |
| Grout | 725.22(f) |
| Mortar | 712.05(a) |
| Rock for masonry structures | 705.03 |

### Construction Requirements

**620.03 General.** Furnish stone that matches the native stone on the project. Submit stone samples representing the range of colors and sizes to be used on the project to the Engineer 14 days before beginning work.

Keep an adequate inventory of the stone on the site to provide an ample variety of stones for the masons. When additional stone is added, mix the new stone with the existing stone in a uniform pattern and color.

Excavate and backfill according to Section 209. Prepare the foundation bed normal to, or in steps normal to, the face of the masonry. Where foundation masonry is used, clean the bearing surface thoroughly and wet immediately before spreading the mortar bed.

**620.04 Placing Stone.** Place stone to provide a uniform pattern and color. Do not place stone masonry when the ambient temperature is below 32°F. Maintain completed masonry at a temperature above 40°F for 24 hours after construction. Clean all stones thoroughly and moisten immediately before placing. Clean and moisten the bed.

When removing and resetting stone masonry, use hand tools to clean the exposed faces of the stones of all mortar before resetting.

Spread the mortar. The thicknesses of beds and joints for face stones are as shown in Table 620–1. Ring stone joints on the faces and soffits are not less than 1/4 inch or more than 1½ inches thick. However, make the bed of each course of uniform thickness throughout.

Construct joints in dimensioned masonry vertical. In all other masonry, joints may be at angles with the vertical from 0
to 45 degrees.

Level the cross beds for vertical walls. Beds for battered walls may vary from level to normal to the batter line of the face of the wall.
Lay the stones with the longest face horizontal and the exposed face parallel to the masonry face. Flush the joints with mortar.

Do not jar or displace the stones already set. If a stone is loosened after the mortar has taken initial set, remove it, clean off the mortar, and relay the stone with fresh mortar.

**Table 620-1**
**Masonry Bed and Joint Thicknesses**

| Class | Beds (inches) | Joints (inches) |
|---|---|---|
| Rubble | 1/2 – 2½ | 1/2 – 2½ |
| Class B | 1/2 – 2 | 1/2 – 2 |
| Class A | 1/2 – 2 | 1/2 – 1½ |
| Dimensioned | 3/8 – 1 | 3/4 – 1 |

**620.05 Pointing.** Conform to the following:

**(a) Pointing new joints.** Crown the mortar in the joints on top surfaces slightly at the center of the masonry to provide drainage.

Where raked joints are required, squarely rake all mortar in exposed face joints and beds to the required depth. Where weather joints are required, slightly rake the joints. Do not leave the mortar flush with the stone faces.

Clean all face stone of mortar stains while the mortar is fresh. After the mortar sets, clean again using wire brushes and acid. Protect the masonry during hot or dry weather and keep it wet for at least 3 days after the work is completed.

**(b) Repointing joints.** Remove loose mortar from joints using a small mason's chisel, small pneumatically-power chisel, or other raking tool approved by the CO. Do not use power saws or grinders. Demonstrate proficiency if power equipment is used before removing mortar from the structure. Remove mortar to a depth of 2 ½ times the width of the joint. Remove any dirt or vegetation with a wire brush or other tools approved by CO. Clean joint of all loose fragments and dust with pressurized air or water.

Before filling the joint dampen adjacent stone. Do not place mortar to a depth greater than 2½ times the joint width. Place mortar in layers of approximately 1/4 inch for joints deeper than 1/8 inch. Add successive layers, once mortar has reached thumb-print hardness. Tool the final layer to match the approved joint appearance. Construct a 3-foot test section of joint along the structure to be approval by the CO before continuing with work. Approved test section maybe incorporated into the work.

Clean excess mortar and stain from stone masonry using a bristle brush after the mortar has dried but before the initial set. Do not use chemicals for cleaning unless approved by the CO. Protect joints during hot or dry weather by keeping damp for 3 days after work has been completed.

**620.06 Constructing Walls.** Construct an L–shaped sample section of wall not less than 5 feet high and 8 feet long, showing examples of face wall, top wall, method of turning corners, and method of forming joints. Do not construct masonry other than the foundation masonry before the sample is approved.

Set face stones in random bond to produce the effect shown on the plans and to correspond with the approved sample section. Do not extend beds in an unbroken line through more than 5 stones and joints through more than 2 stones. Bond each face stone with all contiguous face stones at least 6 inches longitudinally and 2 inches vertically. Do not construct so that the corners of four stones are adjacent to each other.

Do not bunch small stones or stones of the same size, color, or texture. In general, the stones decrease in size from the bottom to the top of work. Use large stones for the bottom courses and large, selected stones in the corners.

**(a) Headers.** Where required, distribute headers uniformly throughout the walls of structures to form at least 20 percent of the faces.

**(b) Backing.** Construct the backing out of large stones. Bond the individual stones composing the backing and heart with the stones in the face wall and with each

other. Fill all openings and interstices in the backing completely with mortar or with spalls surrounded completely by mortar.

**(c) Coping.** Construct copings as shown on the plans. Where copings are not called for, finish the top of the wall with stones wide enough to cover the top of the wall from 1½ to 5 feet in length, and of random heights, with a minimum height of 6 inches. Lay stones in a manner that the top course is an integral part of the wall. Pitch the tops of the top courses of stone to line in both vertical and horizontal planes.

**(d) Parapet walls.** Use selected stones, squared and pitched to line and with heads dressed in the ends of parapet walls and in all exposed angles and corners. Interlock headers with as many headers as possible extending entirely through the wall. Interlock both the headers and stretchers in the 2 faces of the wall. The headers and stretchers shall comprise practically the whole volume of the wall. Completely fill all interstices and spalls with mortar.

**(e) Weep holes.** Provide weep holes for all walls and abutments. Place weep holes at the lowest points where free outlets can be obtained and space them no more than 10 feet center to center.

**620.07 Facing for Concrete.**

**(a) Stone placed before concrete.** Make the back of the masonry uneven to improve the bond to the concrete backing.

Use No. 4 reinforcing steel bent into an elongated letter S to anchor the stone. Embed each anchor in a mortar bed to within 2 inches from the face of the stones. Project the other end ±10 inches into the concrete backing. Space the anchors 18 inches apart both horizontally and vertically.

After the mortar has attained sufficient strength, clean the back masonry surface of all dirt, loose material, and mortar drippings. Wash surfaces just before placing the concrete using a high-pressure water jet.

When placing the concrete, carry a neat cement grout of the consistency of cream on top of the concrete and against the masonry at all times. Coat all interstices in the back of the masonry with grout.

**(b) Concrete placed before stone.** Allow a facing thickness as shown on the plans. Set galvanized metal slots with anchors in the concrete face. Set the anchors vertically at a horizontal spacing not exceeding 24 inches. Place a temporary filling of felt or other material in the slots to prevent filling with concrete.

Where setting the stone facing, fit the metal anchors tightly in the slots at an average vertical spacing of 24 inches. Bend at least 25 percent of the anchors at a short right angle to engage a recess cut in the stone. Extend the anchors to within 3 inches of the exposed face of the stone work.

Where the shape of the concrete face is unsuitable for the use of metal slots, use 9 gage galvanized iron wire ties at a rate of 6 ties for each square yard of exposed surface. Install ties after the concrete has cured using a gun.

Keep the concrete face continuously wet for 2 hours preceding the placing of the stone and fill spaces between the stones and concrete with mortar.

**620.08 Guardwall.** Use rubble masonry. Concrete corewalls for guardwall may be cast-in-place or precast units according to Section 601. Concrete will have a minimum 28-day compressive strength of 3,500 pounds per square inch.

Construct an 25-foot sample section of guardwall. Do not construct additional guardwall before the sample is approved.

Construct the guardwall true and uniform along its length with no stone projecting more than 1½ inches. Make mortar beds and joints according to Table 620-1. Rake the joints and beds to a depth of 2 inches on the front and top sides and to 1½ inches on the back.

Use a one-piece capstone for the full width of the guardwall for at least 25 percent of the total length. Use a two-piece capstone with the joint within 4 inches of the guardwall center for the remaining length.

Place all stones, including the capstones, randomly to avoid a pattern. Lay stones to reflect the width of the expansion joints. Do not leave a gap or a mortar edge at the expansion joint. Use various size stones to coin or key the corners of the guardwall.

**620.09 Acceptance.** See Table 620-2 for sampling and testing requirements.

Material for mortar will be evaluated under Subsections 106.02 and 106.03. Mortar will be evaluated under Subsections 106.02 and 106.04. Rock for masonry structures will be evaluated under Subsections 106.02 and 106.04.

Construction or rehabilitation stone masonry structures will be evaluated under Subsections 106.02 and 106.04.

Excavation and backfill will be evaluated under Section 209.

Concrete will be evaluated under Section 601.

**Measurement**

**620.10** Measure the Section 620 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Measure stone masonry by the cubic yard in the structure.

Do not measure sample wall sections not incorporated in the work.

Measure stone masonry guardwall including terminal sections.

Measure remove and reset stone masonry by the cubic yard in the structure after resetting.

Measure repoint stone masonry along the centerline of joint.

**Payment**

**620.11** The accepted quantities will be paid at the contract price per unit of measurement for the Section 620 pay items listed in the bid schedule. Payment will be full compensation for all work prescribed in this Section. See Subsection 109.05.

**Table 620-2**
**Sampling and Testing and Requirements**

| Material or Product | Type of Acceptance (Subsection) | Characteristic Category | | Test Methods Specifications | Sampling Frequency | Point of Sampling | Split Sample | Reporting Time |
|---|---|---|---|---|---|---|---|---|
| Mortar (712.05) | Measured and tested for (106.04) | Making test specimens Compressive strength | — | AASHTO T 23 & T 22 | 1 per installation | Job site | — | — |

**REVISION OF SECTION 630**
**STORM DRAINS AND CULVERTS**

Section 630 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised as follows:

Section 631 of the City of Colorado Springs Engineering Division Standard Specification is hereby revised as follows:

Complete In Place shall refer to all materials, labor, and equipment required to construct the storm drainage facility as shown in the contract documents including, but not limited to, elbows, bends, tees, special fittings, gaskets, sealants, couplings, coatings, excavation, shoring, dewatering, bedding, storm drain facility installation, backfill, compaction, bringing entire trench width to finished grades, and providing either temporary roadway patch or providing roadway patch that matches the thickness and quality of existing roadway surface. Temporary roadway patch will only be allowed in areas that will be disturbed by other project related activities prior to construction of final roadway surface.

All inlets, manholes, manhole specials, and special structures shall include, but is not limited to, excavation, dewatering, bedding, subgrade preparation, compaction, materials required to construction structure, forming, covers, frames, grate, steel plates, steps, risers, coatings, concrete collars, trash racks, all other materials shown in the contract documents to construct the structure, and backfill to the finished grade or to roadway subgrade with either temporary roadway patch or roadway patch that matches the thickness and quality of existing roadway surface. Temporary roadway patch will only be allowed in areas that will be disturbed by other project related activities prior to construction of final roadway surface.

All pipes penetrating into existing or new structures, manholes, inlets, headwalls, etc. shall have a reinforced concrete or mortar connection / collar that are water tight and structurally stable.

Section 635.01 of the City of Colorado Springs Engineering Division Standard Specification is hereby revised as follows:

AASHTO M-198 “Joints for Circular Concrete Sewer and Culvert Pipe using Flexible Watertight Gaskets’ for bell and spigot or tongue and groove pipe. Also, ASTM C-433 “Joints for circular concrete sewer and culvert pipe, using rubber gaskets”.

Section 635.03 of the City of Colorado Springs Engineering Division Standard Specification is hereby revised as follows:

## ADDITION OF SECTION 705
## MASONRY ROCK

**705.03 Rock for Masonry Structures.** Furnish sound, durable rock that is native to the vicinity of the work or is similar in texture and color to the native rock and has been proven satisfactory for the intended use.

Furnish dimensioned masonry rock free of reeds, rifts, seams, laminations, and minerals that may cause discoloration or deterioration from weathering.

Existing, on-site rock may be reused if it meets the requirements below.

**(a) Sizes and shapes.** Do not use rock with depressions or projections that might weaken it or prevent it from being properly bedded.

When no dimensions are shown on the plans, furnish the rocks in the sizes and face areas necessary to produce the general characteristics and appearance indicated on the plans.

Unless otherwise specified, furnish rock fragments with the following dimensions:

| | |
|---|---|
| **(1)** Minimum thickness | 5 inches |
| **(2)** Minimum width whichever is greater | 12 inches or 1½ times the thickness, |
| **(3)** Minimum length | 1½ times the width |
| **(4)** Rocks with volume ≥ 1 cubic foot | 50% min. |

When headers are required, furnish headers with lengths no less than the width of bed of the widest adjacent stretcher plus 12 inches.

**(b) Dressing.** Remove all thin or weak portions. Dress face rock bed and joint lines to a maximum variation from true line as follows:

| | |
|---|---|
| **(1)** Rubble masonry | 1½ inches |
| **(2)** Class B masonry | 3/4 inch |
| **(3)** Class A masonry | 1/4 inch |
| **(4)** Dimensioned masonry | Reasonably true |

**(c) Bed surfaces.** Dress face rock bed surfaces normal to the face to a depth of 3 inches. Beyond that point, the departure from normal may not exceed 1 inch in 12 inches for dimensioned masonry or 2 inches in 12 inches for all other classes.

**(d) Joint surfaces.** For dimensioned masonry, dress face rock joint surfaces normal to the bed surface. For all other classes of masonry, dress face rock joint surfaces to form an angle with the bed surface of not less than 45 degrees.

Dress face rock joint surfaces normal to the face to a depth of 2 inches. Beyond that point, the departure from normal may not exceed 1 inch in 12 inches.

Do not round corners at the meeting of the bed and joint lines in excess of the following radii:

| | |
|---|---|
| **(1)** Rubble masonry | 1½ inches |
| **(2)** Class B masonry | 1 inch |
| **(3)** Class A masonry | No rounding |
| **(4)** Dimensioned masonry | No rounding |

**(e) Arch ring rock joint surfaces.** Dress ring rock joint surfaces radial to the arch or normal to the front face to a depth of 3 inches. Beyond that point, the departure from the radial or normal may not exceed 3/4 inch in 12 inches.

Dress the back surface adjacent to the arch barrel concrete parallel to the front face and normal to the intrados to a depth of 6 inches. When concrete is placed after the masonry is constructed, vary adjacent ring stones at least 6 inches in depth.

**(f) Finish for exposed faces.** Remove all drill or quarry marks from exposed faces. Pitch face stones to the line along all beds and joints. Finish the exposed faces as specified in the contract. The following symbols are used to represent the type of surface or dressing specified:

**(1) Fine pointed (F.P.).** Make point depressions approximately 3/8 inch apart. Limit surface variations to 1/8 inch or less from the pitch line.

**(2) Medium pointed (M.P.).** Make point depressions approximately 5/8 inch apart. Limit surface variations to 1/4 inch or less from the pitch line.

**(3) Coarse pointed (C.P.).** Make point depressions approximately 1⅛ inches apart. Limit surface variations to 3/8 inch or less from the pitch line.

**(4) Split or seam face (S.).** Provide a smooth appearance, free from tool marks, with no depressions below the pitch line, and no projection exceeding 3/4 inch beyond the pitch line.

**(5) Rock faced (R.F.).** Provide an irregular projecting surface without tool marks, concave surfaces below the pitch line, and projections beyond the specified pitch line. For example, the specification "1.50 R.F." means no projections 1½ inches beyond the pitch line. Where a "variable rock face" is specified, uniformly distribute stones of the same height of projection.

## ADDITION OF SECTION 712
## MASONRY JOINT MATERIAL

**712.05 Mortar for Masonry Beds and Joints.**

**(a) Type I mortar.** Furnish and proportion masonry mortar according to ASTM C 270 proportion specifications.
Mortar may be preblended or mixed on site. Use only masonry cement mortar type M or S.

**(b) Type II mortar.** Furnish mortar and material for use in mortar conforming to the following:

| | |
|---|---|
| **(1)** Cement | |
| *(a) Portland Cement* | Subsection 701.01(a), type I, IA, II, IIA, III, or IIIA |
| *(b) Blended hydraulic cement* | Subsection 701.01 (b), type IS, IS-A, IP, IP-A, I(PM) or I(PM)-A |
| *(c) Masonry cement* | Subsection 701.02 |
| **(2)** Fine aggregate | Subsection 703.01or AASHTO M 45 |
| **(3)** Lime | ASTM C 207, type S or SA. Type N or NA, if tests show it not to be detrimental to mortar soundness. |
| **(4)** Water | Subsection 725.01 |
| **(5)** Air entraining admixture | Subsection 711.02 |
| **(6)** Composition | Conform to the proportions for one of the mixes in Table 712-3. Uniformly mix with water to a spreading consistency. |
| **(7)** Compressive strength | 2,000 pounds per square inch, 28-day min., AASHTO T 106 |

**Table 712-3**

| Mortar | Portland Cement | Hydraulic Cement | Masonry Cement | Lime | Aggregate | Air (%)* |
|---|---|---|---|---|---|---|
| Cement – Lime | 1 | — | — | ¼ to ½ | Not less than 2-1/4 and not more than 3 times total volume of cementous material | 8-12 |
| Masonry Cement | — | — | 1 | — | | 8-12 |
| Hydraulic Cement | — | 1 | — | ¼ to ½ | | 8-12 |

**Mortar Proportions by Volume**

***When air is required, determine air content per ASTM C 91 except use the same material and proportions used in construction.

**ADDITION OF SECTION 722**
**MISCELLANEOUS MATRERIAL GROUT**

**725.22 Grout.** Furnish grout mixtures conforming to the following for the type or types specified in the contract.

**(a) Expansive hydraulic sanded cement grout.** Furnish a mixture of hydraulic cement, fine aggregate, water, expansive admixture, and/or pozzolan, or additional admixtures, conforming to the following:

| | |
|---|---|
| **(1)** 7-day compressive strength, AASHTO T 106 | 600 pounds per square inch min. |
| **(2)** Flow (time of efflux), ASTM C 939 | 16 to 26 seconds |

**Note:** A more fluid mix, having a flow cone time of efflux of 9 to 15 seconds, may be used during the initial injection.

Submit the following with the production certification:

- Current material certifications for the hydraulic cement, fine aggregate, expansive admixture, and other grout additives; and
- Independent laboratory test results for 1-day, 3-day, and 7-day strengths, flow cone times, shrinkage and expansion observed, and time of initial set.

**(b) Polymer grout.** Furnish a polymer binder and fine aggregate in the proportions recommended by the polymer manufacturer with a minimum compressive strength of 3,500 pounds per square inch in 4 hours.

**(c) Nonshrink grout.** Conform to ASTM C 1107.

**(d) Grout for Post-Tensioned Structures.** Conform to the requirements of the *PTI Guide Specification for Grouting of Post-Tensioned Structures.*

**(e) Sanded Hydraulic Cement Grout for Miscellaneous Applications.** Furnish 1 part hydraulic cement and 3 parts sand. Thoroughly mix with water to produce a thick, creamy consistency.

**(f) Neat hydraulic cement grout.** Furnish a grout consisting of a mixture of hydraulic cement, water, and admixtures. Do not exceed a water/cement ratio of 0.44. Fly ash, if used, shall not exceed 20% of the cement by weight. Admixtures to reduce water content, improve the flowability, control bleeding, or control shrinkage may be added according to the manufacturer's recommendations. Admixtures shall be free of chlorides, fluorides, sulphites, and nitrates.

Project No. BRO M240-117
PCN 16986 November 18th, 2015

**REVISION OF SECTION 800**
**WORK ZONE TRAFFIC CONTROL**

Section 800 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised as follows:

Section 805.06.D shall include the following:

Advanced notification of any lane closures shall be made using variable message signs (VMS) a minimum of 48 hours prior to the closure and shall remain in place until the lane has been closed for 48 hours.